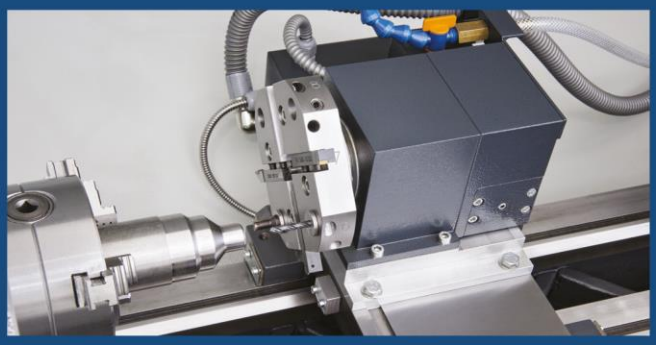

Operating Instructions

CNC lathe

With slant bed

CC-D6200 hs

WABECO

MASCHINENMANUFAKTUR seit 1885

Please read before putting into operation for the first time!

Every person that operates the machine, maintains or repairs it, must have read the operating instructions, and in particular, the safety notes prior to putting the machine into operation. Please store these documents for subsequent use

Original version in German/translation in English
Status at 04/2015

Dear Customer!

With the purchase of the **WABECO machine** you have decided in favour of a quality tool. This machine has been manufactured with the greatest of care and subject to precise quality controls.

These operating instructions are designed to help you to use your new machine safely and correctly. For this reason, we ask you to read the appropriate notes through attentively and to take care to observe them.

After unpacking the tool, check whether any transportation damages have occurred. Complaints, whatever their nature, should be communicated immediately. Subsequent claims **cannot** be recognised.

For all queries and replacement part orders, please **always specify the machine number** (see type plate).

Reprinting and reproductions of any kind, even extracts, require the written permission of WABECO

Disposing of the machine

The transportation and protective packaging is made of the following materials:

- Corrugated card
- Polystyrene without Freon
- Polyethylene foil
- Timber as single-use pallet (untreated)
- Euro pallet (multiple use packaging)

If you no longer need the items, or you do not want to reuse them, dispose of these items at the officially recognised recycling points.

The machine is manufactured in such a way that 98% of the used materials that can be recycled, for example, steel, cast iron, aluminium and only 2% are chemical materials, e.g. cable sleeves of electrical cables, PCBs.
If you have any difficulties in disposing of these parts properly, we would be happy to help: with prior agreement we will take back the machine in full and dispose of it. You must, however, cover the costs of sending it to us.

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Declaration of conformity

We hereby declare, in the name of the manufacturer

Walter Blombach GmbH

Tool and machine factory
with registered office in Remscheid and Neuerburg

D-42871 Remscheid	P O Box 12 01 61	Phone: (02191) 597-0	Fax: (02191) 597-40
D-54673 Neuerburg	WABECO Str. 1-10	Phone: (06564) 9697-0	Fax: (06564) 9697-25

that the following named

CNC lathe

Type:

CC-D6200 hs

in the serial version, meets the following relevant regulations

- **EU Machine Directive 2006/42/EC**
- **EMC Directive 2004/108/EC**
- **EU Low Voltage Directive 2006/95/EC**

In order to fulfil/implement the requirements of the directives named above, the already published and applicable standards were drawn upon:

EN ISO 12100:2010
DIN EN 60204-1:2006
EN ISO 23125:2010

Proxy for the compilation of the technical documentation is the operational head of the above named manufacturer, Mr Christoph Schneider.

D-54673 Neuerburg 2015

Place and date of issue

Betriebsleiter Christoph Schneider

1. Important safety notes

1.1 Intended use

The lathes described in these operating instructions are designed for the processing of metal, plastic and timber only.

To ensure safe operation of the lathes, the regulations set out in the chapter: "Safety regulations" must be observed.

1.2 Improper and incorrect use

The lathes described in these operating instructions have been developed and manufactured for the purpose named above. Walter Blombach GmbH accepts no responsibility for property damage and personal injury caused as a result of not intended and incorrect use of the lathes.

1.3 Modifications to the machine

For reasons of safety, it is forbidden for the user to make modifications of any type to the lathe.

Walter Blombach GmbH accepts no responsibility for property damage and personal injury caused as a result of any modifications to the lathe by the user that have not expressly been authorised by the company.

1.4 Safety regulations for proper use

The machine may represent a source of danger if it is not used correctly. For this reason, it is important that the following safety regulations are read attentively and observed carefully.

Every person that operates the machine, maintains or repairs it, must have read the operating instructions, and in particular, the safety notes prior to putting the machine into operation.

In order to fulfil these requirements, these operating instructions must accompany the machine throughout its entire lifetime and be available for research.

In the event that the machine changes owners, the operating instructions must thus be passed on to the new owner along with the machine.

1. Important safety notes

1.4 Safety regulations for proper use

Only spcedially trained persons may operate the machine. The guarantee and warranty are voided if damages are caused by improper operation.

1. **We remind you that no liability will be accepted for damages caused by not observing these operating instructions.**
2. **The operator of the machine is to ensure that at least one copy of the operating instructions is stored in the immediate vicinity of the machine and available to the people who work with the machine.**
3. **The operator is to ensure that the safety and danger notifications on the machine are observed and that the signs are kept in a legible state.**
4. **Do not work without goggles.**
5. **Wear close fitting clothing and, if you have long hair, wear a hair net. Do not wear loose fitting or loose items (ties, shirt sleeves, jewellery etc.).**
6. **Gloves may not be worn.**
7. **In the event of an emission noise level as of 80 dB (A) at the workplace, ear defenders must be worn.**
8. **The machine may not operate without supervision.**
9. **Secure your machine in such a way that it cannot be switched on by children. Persons who have not been trained may not operate the machine.**
10. **Before using the machine, make sure it is in good working condition. Pay special attention to any damage to the grounded plug or the electrical connections. Never operate the machine with a defective, crushed or exposed cable.**
11. **Plug the grounded plug into a suitable socket for the machine. The cable for the machine may only be connected to a safety socket or a connection box. Have the safety socket or connection box checked by an electrical specialist before hand.**
12. **The safety socket or connection box must be close enough to the machine that the power cable is not under strain.**
13. **When carrying out maintenance and cleaning work, the machine must be switched off and the grounded plug pulled out.**
14. **Set-up work is only to be carried out with the machine switched off.**
15. **Do not reach into the operating machine.**
16. **Always switch the machine off when you are not using it.**
17. **Remain with the machine until it has come to a standstill.**

1. Important safety notes

1.4 Safety regulations for proper use

18. **Only have repairs carried out by a qualified specialist! Repair work may only be carried out by persons who are qualified for the relevant repairs and who are familiar with the appropriate health and safety requirements.**
19. **Protect the machine from damp.**
20. **Constantly check the machine for damages. Replace damaged parts only with original parts and have these replaced by a specialist. The guarantee and warranty is voided if accessories and replacement parts are use that are not designed for the machine.**
21. **Do not remove the generated shavings with your hand. Use the appropriate tools (hand-held sweeper, hook, brush).**
22. **Tools and work pieces may never be changed when the machine is running.**
23. **Do not brake work pieces and bush using your hand or another object.**
24. **Never leave the chuck key fitted (even when not in operation).**
25. **Pay attention to the spread of the lathe chuck.**
26. **The maximum revolution range specified on the lathe chuck may not be exceeded.**
27. **Always keep safety door to motor closed**
28. **The safety door to motor may only be opened by trained personnel with a special key by unplugged safety contact pug**
29. **Turning steels must be firmly tensioned, at the correct height and as short as possible.**
30. **Do not measure at the rotating work piece (risk of accident, measuring tools will be damaged).**
31. **When working between the tips, check the locking lever of the tailstock for firm seating.**
32. **When working with the automatic feed, always pay attention to ensure that the tool skid does not come up against the lathe chuck or the tailstock.**

1. Important safety notes

1.5 Safety features

In order to enable you to work safely with our machines, we have incorporated the following safety mechanisms. These meet the relevant European safety requirements.

- **Safety cabin**
  In order fort he machine to operate in CNC mode, the door to the safety cabin must be closed.
- **ON/OFF switch with under-voltage trigger**
  The ON/OFF switch is fitted with an under-voltage trigger, thus, in the event of a power failure, the machine does not switch itself back on automatically. This prevents risks caused by the unexpected motion of the spindle.
- **Emergency off switch**
  The emergency off switch acts to quickly stop the machine
- **Overload protection**
  The machine is fitted with an overload protection feature. This overload protection feature switches the main drive motor off automatically when the machine is overloaded. The machine can only then be switched on after a waiting period.
- **Switch for operating modes (only for CNC machines)**
  The mode switch has 3 settings (CNC mode – Idle position – Manual mode) that can only be selected with a key. After selecting the mode, the key can be removed in order to prevent a switching of the mode type by unauthorised persons.

  Working in CNC mode is only possible **when door is closed.** The door is locked as soon as the main spindle starts. If the door is open, the main spindle cannot be started.

  Working in set-up mode can be executed while the door is open. The switch for operating modes has to be set to set-up mode.

  The main spindle can be activated by closed as well as open door.

1. Important safety notes

1.6 Explanations of the symbols

With an emission noise level as of 80 dB (A) at the workplace ear defenders must be worn

Caution:
Always pull the power plug prior to any maintenance work!
Read the operating instructions prior to initial operation or maintenance work!

Caution:
Dangerous electric voltage!

2. Delivery and set up

The machine is packed with care at the factory.

The following should be checked after delivery:

1. Whether the packaging shows damages to be reported or
2. Whether the machine shows transportation damages to be reported If this is the case, we ask you to communicate this information immediately. Subsequent claims cannot be recognised.

The machine must be set up on a suitable, even and firm surface.
Suitable surfaces are, for example:

- A tool cabinet (available optionally)
- A separate workbench with a level surface (spirit level) that is strong enough to carry the weight of the lathe without bending.
- A steel plate with a level surface (spirit level)

The machine must be screwed securely to the surface it is set up on. There are holes in the base of the machine that are designed for this purpose. **Good working results and low-vibration operation can only be ensured when the prerequisites for fixture as set out above are maintained.**

2. Delivery and set up

The place of set-up should be selected in such a way that

- there is sufficient lighting
- the electrical supply cable with socket outlet with earthing contact and 0-conductor is installed close enough to the machine that the supply line is not subjected to any tensile load.

The machine has to be screwed to the installation surface and/or provided with a safe stand by using level elements. For this purpose, the base cabinet of the machine has four fixation thread bores (M10) as well as four fixation bores (Ø 12.5 mm).

The doors of the safety cabin can only be opened if the machine is switched to operation modes CNC or set-up if the main spindle is not moving.

2.1 Transport of machine

To transport the machine it is advisable to lift it at the lower cabinet with a forklift or platform trolley at the base cupboard of the safety cabin and carefully move it to the desired location. For this purpose, use wide forks (max. 1260 mm). We recommend using an intermediate plate for optimal load distribution and the protection of the machine. For example, a Euro-pallet of 1200 x 800 mm is suitable.

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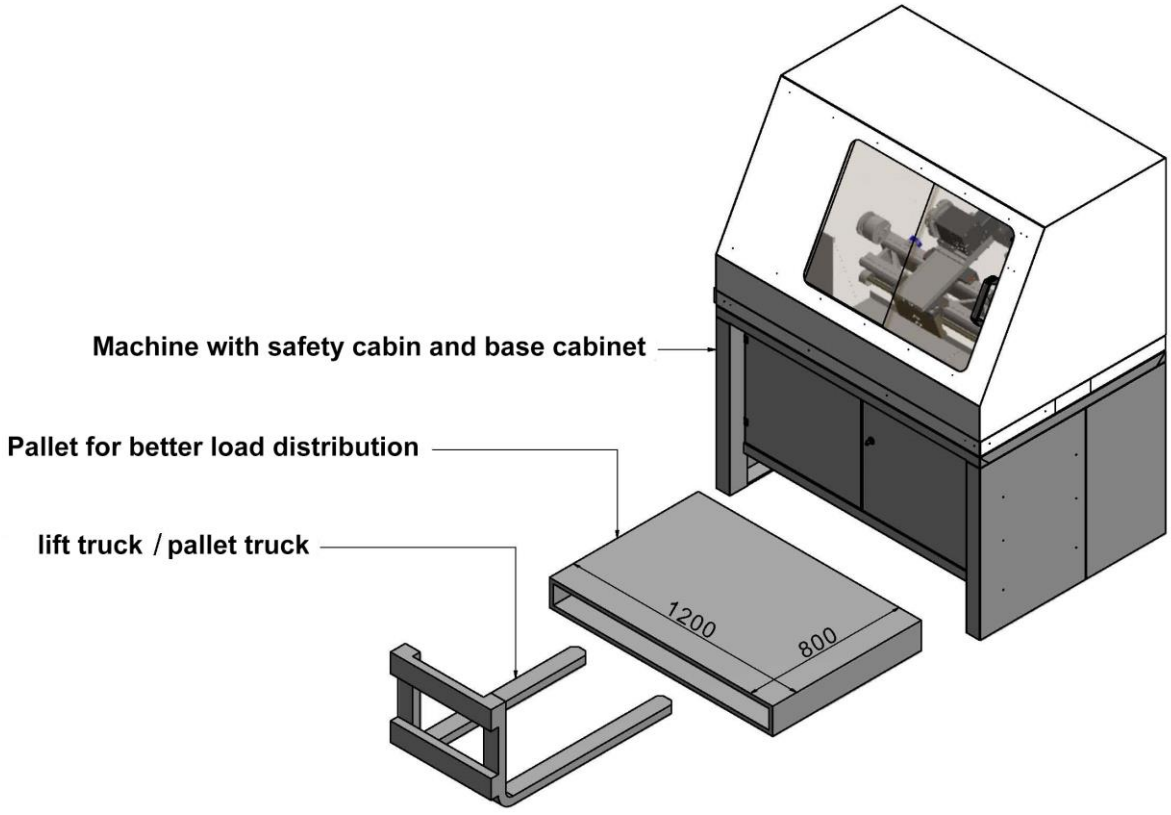
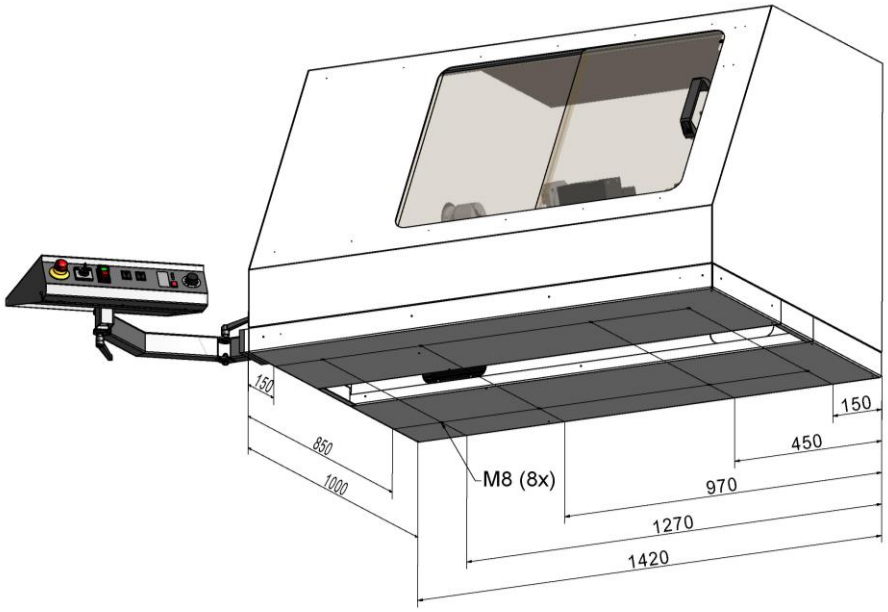


2. Delivery and installation

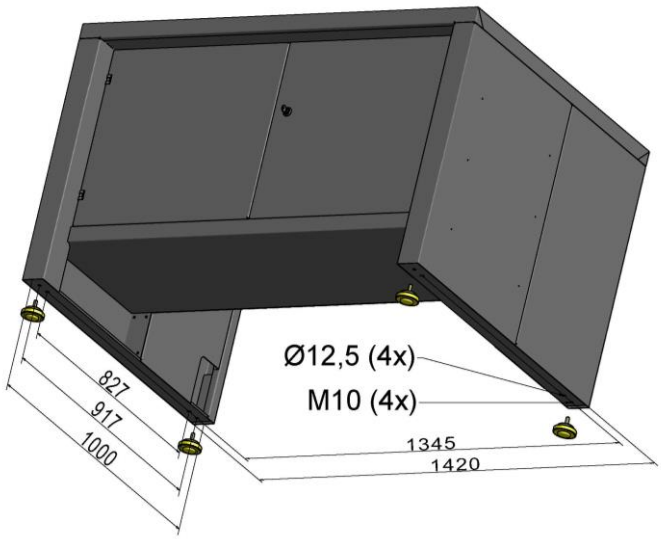
2.2 Installation

The appropriate bores for the installation of the safety cabinet onto a WABECO machining tool cabinet are already provided. The machining tool cabinet ensures secure positioning of the lathe and/or safety cabin.
If the safety cabin is installed on another suitable installation surface, the 8 through-bores have to be drilled in the customers installation surface. The positions of the 8 fixation threads (thread M8) of the safety cabin are illustrated below. The diameter of the through-bores in the installation surface has to be at least 9 mm.



The hexagon bolts (M10) included in the scope of delivery of the base cabinet can be used for adjustments. For this purpose, first screw the hex nut (M10), which are also included in the scope of delivery, to the hex bolts. Subsequently, insert the screws equipped with nuts into the four provided threads from below in the base cabinet. The base cabinet can now be adjusted by tightening or loosening the screw. Once the base cabinet is adjusted, you can counter the hexagon bolts with the nuts on the screws to secure their position.

Good work results and low vibration running are only possible if the above-mentioned prerequisites for mounting are complied with.



3. Putting into operation

- Use a dry cloth to remove the corrosion protection that was applied to all exposed parts for transport
- In the event of marine impregnation of exposed parts, it is recommended you spray them with oil, allow it to work, and then remove the impregnation with a dry cloth
- Once set up properly (see the section on delivery and set up) connect the grounded plug directly to a safety socket and the 230 V 50/60 Hz (optional 110 V 60 Hz) mains power supply
- Provision of sufficient coolant for the operation of a coolant system.
- Check all electronic operating elements, for example, ON/OFF switch, emergency off switch, potentiometer, bush protection hood, etc. for functionality
- When putting CNC machines into operation for the first time, always read the start-up manual

3.1 Setting up and connecting the control computer

When selecting a suitable control computer, pay attention to the system prerequisites of the control software. These are listed on the rear of the CD case sent with the machine.

Follow the instructions in the start manual of the software to install the control software on the computer. The start manual can be found in the CD case of the control software included with the machine.

In the next step, the software must be adapted to your machine. To do this, follow the instructions sent with the machine which detail the editing of the parameters.

When the software has been successfully installed on the control computer and all parameters have been adapted successfully, the control computer must be connected with the machine controller.

The machine controller communicates with the computer via the serial interface (COM port). In order to establish a connection between the machine controller and the computer, connect the end of the interface cable that is on the machine console to the COM port of the computer.

CAUTION:
The axis cable of the multiphase motors and the serial interface cable may only be plugged or unplugged with the control switched off. Otherwise damages to the control, the machine or the control computer may occur!

4. Information regarding the machine

4.1 Identification of the model

The precise model designation of your machine can be found on the type plate attached to the machine.

4.2 Noise emission declaration

Noise emission declaration in accordance with DIN EN ISO 3744
Emission values in idle

Emission noise level at the workplace	
at 50 %	= 68.0 dB (A
at 100 %	= 73.6 dB (A)
Sound power level	
at 50 %	= 77.8 dB (A)
at 100 %	= 82.3 dB (A)

With an emission noise level as of 80 dB (A) at the workplace ear defenders must be worn

4. Specifications regarding the machine

4.3 Technical data

Working areas	
Distance between centres	600 mm
Centre height	135 mm
turning-Ø above cross slide	170 mm
Swing diameter via guide	270 mm
Bed width	185 mm
Main drive motor	
Nominal voltage	230 V
Nominal frequency	50/60 Hz
frequency controlled main drive motor 230 V, 50/60 Hz	2.0 kW
Spindle revolutions, infinite	50 - 5000 rpm
Machine accuracy	
Concentricity of the spindle lug	0,005 mm
Cylindrical rotation on 100 mm overhung	0,01 mm
Cylindrical rotation with simple turning on 300 mm between the centres	0,015 mm
Headstock	
Main spindle aperture	Ø 20 mm
Taper in main spindle	MK3
Main spindle lug	According to DIN 6350
Tool skid	
Adjustability of the transverse skid	140 mm
Adjustability of the longitudinal skid	60 mm
Longitudinal skid can be swivelled by	360°
Max. turning steel height	20 mm
Tailstock with quick adjustment	
Lateral adjustability of the tailstock upper	± 10 mm
Tailstock sleeve	With inner Morse taper MK2
Sleeve adjustability	65 mm
Scale ring read accuracy	0.1 mm
Thread cutting	
Tumbler gear drive	For left-right thread
2 automatic longitudinal feeds	0.085 and 0.16 mm/revolution
Change gear set for thread cutting	Metric 0.25 - 7.0 mm - imperial 10 - 40 G/"

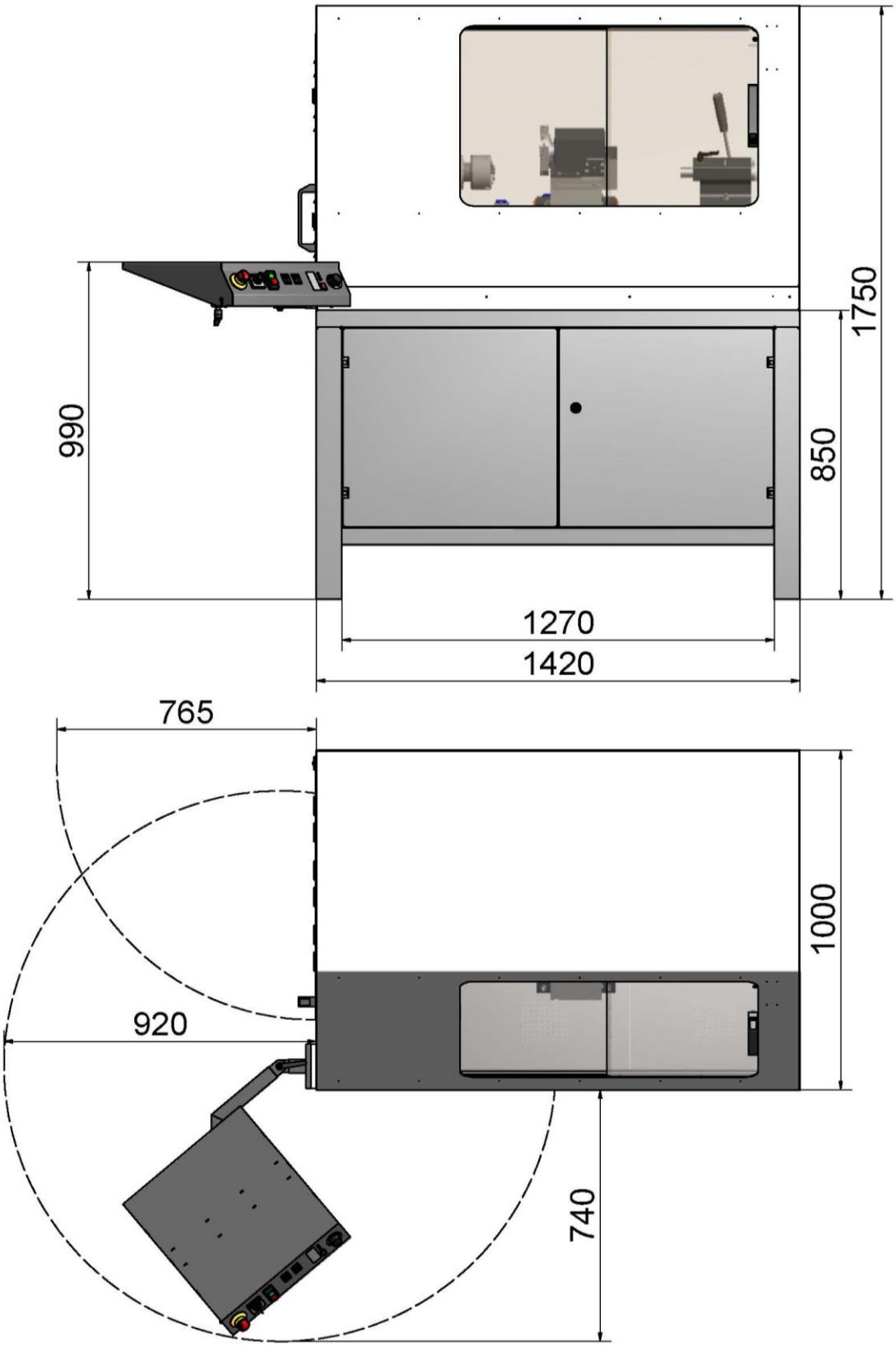
4. Specifications regarding the machine

4.3 Technical data

Positioning accuracy	± 0.015 mm
Travel speed (fast mode)	
x and y axes	30 – 1,000 mm/min
Toolchanger	
cross section for 4 external machining tool	10 x 10 mm
location bore for 4 internal machining tools	Ø 16 mm
Safety cabin	
volume coolant	27 litre
feed pump	230 Volt, 50/60 Hz

4. Specifications regarding the machine

4.4 Dimensions



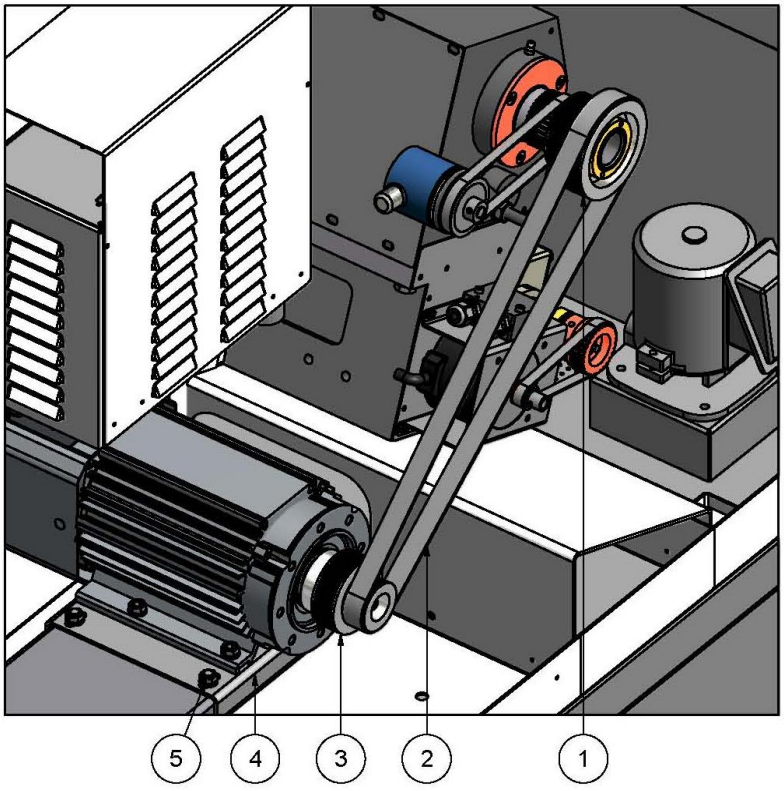
4. Specifications regarding the machine

4.5 Revolution changer

The potentiometer ((8) of the control panel) allows the infinite setting of the revolutions of the tool spindle from **50 to 4800 rpm** (2. level = default setting). In order for the revolutions to be activated correctly via software, the potentiometer **must** be set to 100%. During the operation, it can be used to minimally adjust the revolution according to the processing conditions.

If the lower revolutions of 50-2500 rpm (1st setting) are required, the drive belt must be applied. To do this, proceed as follows:

1. Open the gear cover hood by undoing the safety screw with the supplied special key.
2. Release the four hexagon nuts (5); this allows the sliding of the clamping sled (4) of the motor.
3. Slide the clamping sled incl. motor toward the machine; this loosens the belt tension and the belt can be relocated.
4. Place the drive belt (2) onto the otertransmission oft he belt disks (1+3). (Small diameter at motor, large diameter at main spindle.)
5. Pull the clamping sled (4) of the motor away from machine to tension the drive belt (2) and refasten the four hexagon nuts (5).
6. Close the protective drive door and secure with both safety screws.



4. Specifications regarding the machine

4.5 Revolution changer

The following table illustrates the torque of the work spindle depending on the selected gear level and setting of the potentiometer.

Setting on the potentiometer	1st setting rpm	2nd setting rpm
0%	50	100
10%	200	370
20%	470	900
30%	725	1400
40%	970	1900
50%	1225	2400
60%	1470	2900
70%	1725	3400
80%	2000	4000
90%	2280	4500
100%	2500	4800

4. Specifications regarding the machine

4.6 Electrical equipment

The frequency-regulated main drive motor is delivered already installed

- the under-voltage trigger is integrated in the electronics of the motor
- The ON/OFF switch has to be switched on again also after an interruption of power
- In the event of the main drive motor being overloaded, it will switch itself off automatically.
- The main drive motor can only be switched back on again after a short waiting period
- For this purpose, first switch the machine off via the ON/OFF switch; wait 5 seconds and reactivate.

5. Set up tools

First, the correction values for all 8 tools have to be set to 0.00 in the tool memory in X and Z.
(Parameter → CAM → tool memory)

Tool 1 is the 0-tool,
The adjusted amounts are here generally maintained at X 0 and Z 0.

- Run machine reference

- Select tool **T1**
  to random diameter in **X** and run to beginning of workpiece in **Z**.
  (if required, clamp turned part and turn splint)

  Leave X-axis at turned diameter in **X** and set **Z**-axis
  to beginning of workpiece.
  Here, work piece zero point sets keyboard combination (Ctrl X) (Ctrl Z)

  (Position display = *X* 0.00 **Z** 0.00)

- Select tool **T3**
  Move to same position in **X** and **Z** with tool **T3**
  where zero was set previously with **T1**
  (in **X** to turned diameter and in **Z** to workpiece starting point)

- The new position value of **X**-axis is not
  X 0.00 at the turned diameter, but e.g. **X 10.80**

- Enter in tool memory at **T3**:
  New position value in **X** = 10.80
  Radius is / 2 = 5.40

  Adjusted amount in **X** **= 5.40**

- The new position value of display **Z**-axis at start of work piece is e.g. **Z** – 8.00
  Enter at **T3** in tool memory:
  New position value in **Z** = = - 8.00

  Adjusted amount in **Z** **= - 8.00**

5.1 Set workpiece zero point

Select **T1**
Drive with workpiece **T1** to turned diameter in **X**-axis.
(Position display in X-axis = **0.00**)
Measured turned diameter = e.g. **15.20**
Now enter the required zero floating for **X**- axis in direct entry field.
G54 X- 15.20 (Enter)
New value in position display **= X 15.20**

6. Coolant system

6.1 Safety regulations for the handling of cooling lubricant

1. Pay particular attention to leaked coolant as this can quickly cause people to slip and caused accidents as a result.
2. Secure your coolant system in such a way that it cannot be switched on by children. Persons who have not been trained may not operate the coolant system.
3. Ensure you have a clean workplace, dirty areas can quickly lead to accidents.
4. Never use the coolant system when processing magnesium alloys. In combination with water-mixed coolants, this may result in flammable gas mixtures which may explode under certain circumstances.
5. Avoid longer skin contact with the coolant.
6. Use skin protecting creams when handling coolants.
7. Regularly monitor the concentration of the water-mixed coolant.
8. Regularly monitor the pH value of the coolant.
9. Make sure that the coolant is only disposed of in an environmentally friendly way in accordance with the relevant guidelines. Coolant is a special waste product.

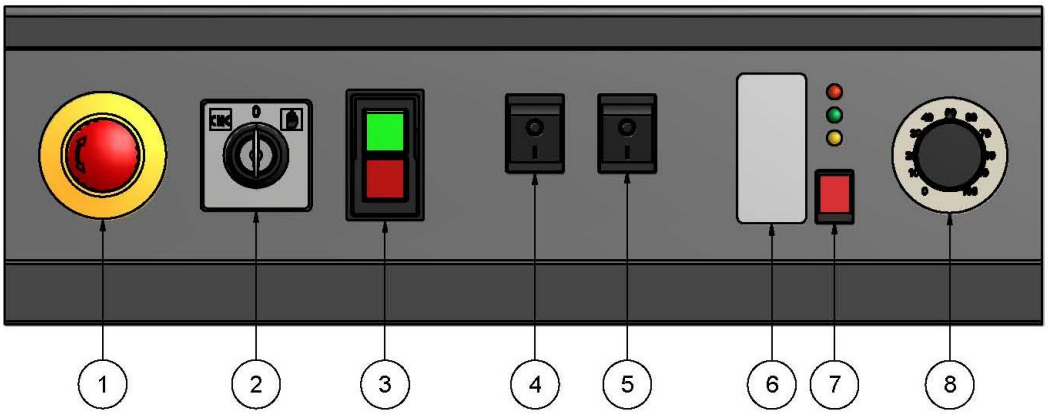
6.2 Filling the coolant system

A number of protective measures must be observed and taken in order to ensure that the handling of coolant does not cause health risks or environmental loads.

- Always observe the datasheet and the safety regulations of the coolant being used (can be obtained from the supplier or manufacturer)
- Observe all safety regulations set out in these operating instructions, in particular those that refer to the safe handling of coolants.
- In order to ensure reliable operation of the coolant pump, a minimum coolant filling level is required in the coolant tank.
- The capacity of the coolant system is approximately 19 litres.
- The maximum filling level should be just below the shelf insert
- The minimum filling level is approximately 15 mm below that.
- To fill, remove the shelf insert and fill to the maximum filling level with a suitable coolant whilst observing all safety regulations.
- After filling, replace the shelf insert

6. Coolant system

6.3 Operating the coolant system



(4) Switch for coolant pump

Switch position (0) → Pump switched off

Switch position (I) → Pump switched on

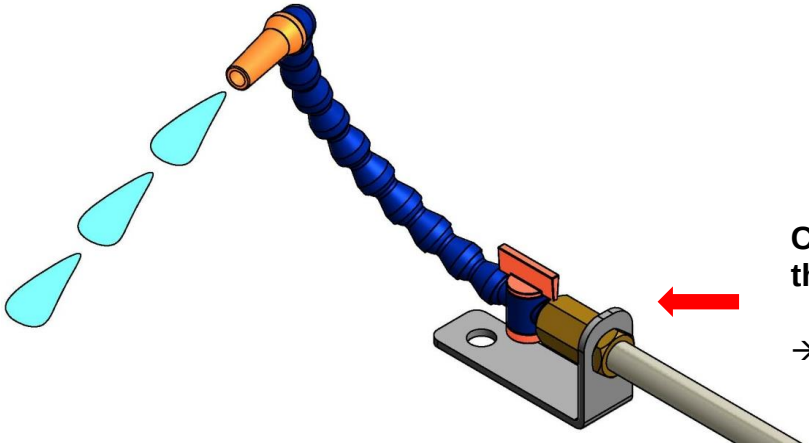
(Caution: Coolant flow is controlled with the coolant shut-off valve)

6.4 Positioning the segmented coolant hose

The flexible segmented hose (shown in blue) is made up of individually adjustable elements and can be shaped by hand or set as required. The segmented hose and the nozzle are to be positioned in such a way that the coolant flows as directly as possible onto the blade of the cutting tool of the lathe. Attention should be paid to ensure that the nozzle does not come into contact with the cutting tool.

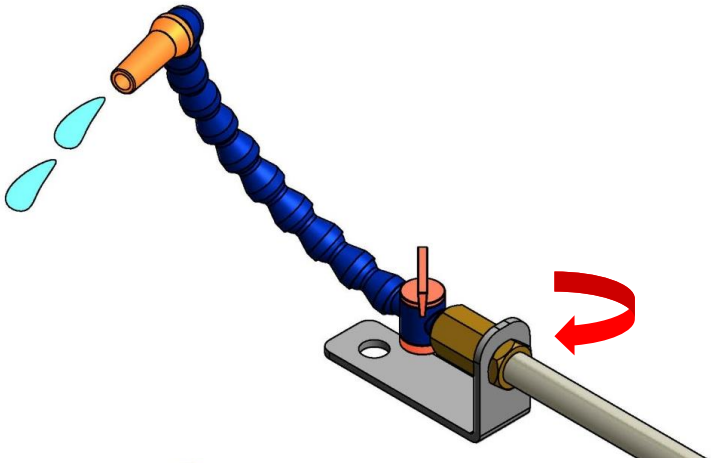
6. Coolant system

6.5 Positioning the segmented coolant hose



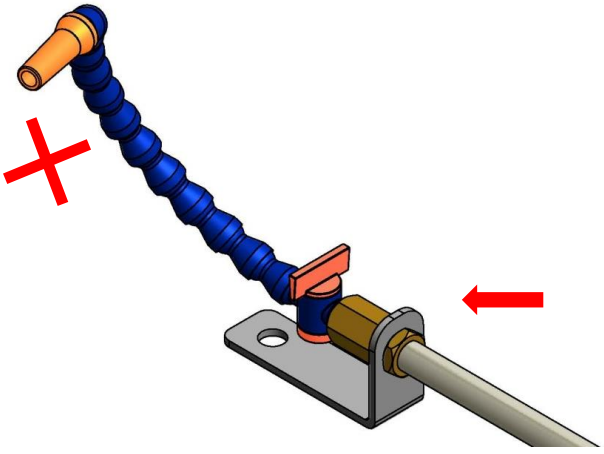
Coolant shut-off valve in the "open" position

→ Maximum coolant flow



Rotation of the coolant shut-off valve clockwise

→ Flow is reduced



Coolant shut-off valve in the "closed" position

→ Coolant flow stopped

7. Maintenance

A long lifetime of the machine will depend on the appropriate care and maintenance.

- **All maintenance and repair tasks may only be carried out with the grounded plug pulled.**
- The machine must be cleaned after each use.
- If the machine is set up in a wet room, all exposed parts must be oiled after each use to prevent corrosion.
- Always lubricate all moving parts well.
- In the event of bearing or skid play, immediately adjust in order to prevent it from destroying the bearing or skid guide.

Approximately every 100 operating hours

- Check the tension of the poly V and gear belt and adjust if necessary.
- Check the play in the guides and feed spindles and set if necessary.

8. Lubrication of the machine

The lubrication process:

- Reduces wear and friction
- Increases the lifetime
- The metal surface are protected from corrosion

We recommend:

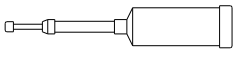
- A class 2NLGI multi-purpose grease for lubrication
- A lubrication oil with a viscosity of 100 mm ^{2}/s for oiling

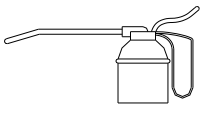
The lathe is to be lubricated every 8 hours of operation in accordance with the lubrication plan. The lubrication points.

- Bed guide
- Dovetail guide cross slide
- Dovetail guide traverse slide
- Tailstock sleeve

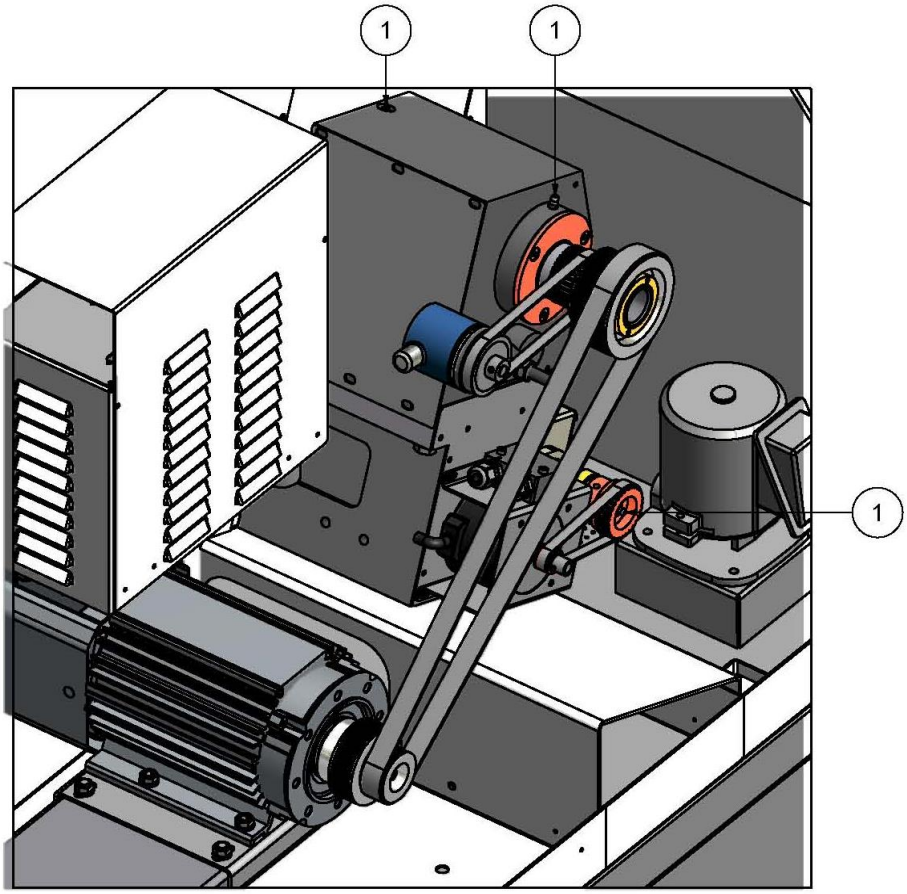
Are lubricated with the help of an oil can and an ordinary lubrication oil by moving the skid or sleeve backwards and forwards.

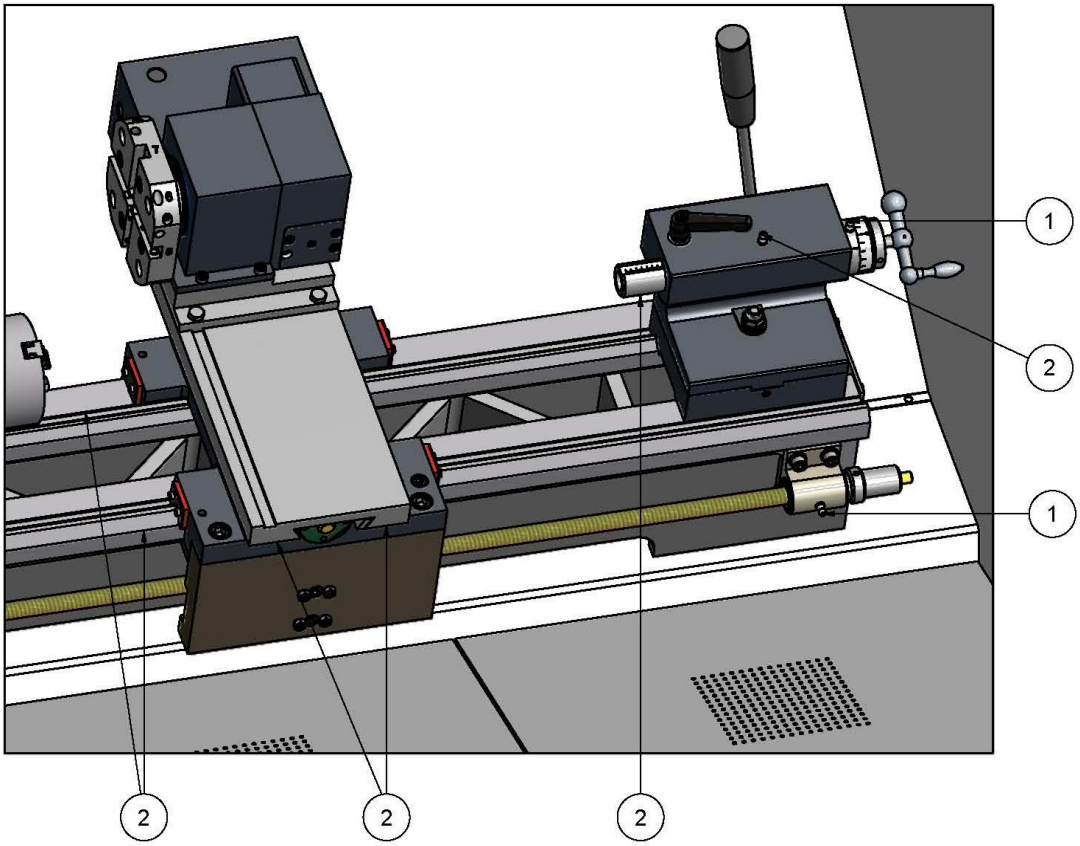
All other lubrication points are lubricated with a grease press at the designated lubrication nipples.

1  Every 8 hours of operation

2  Every 8 hours of operation

8. Lubrication oft he machine



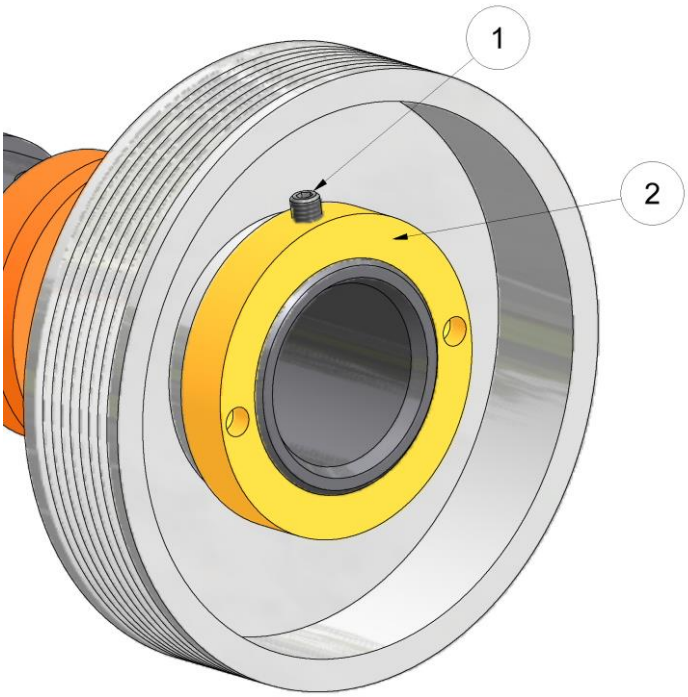


9. Readjusting the main spindle

The headstock is screwed to the lathe bed. The headstock contains the main spindle with two adjustable precision tapered roller bearings.

If adjustment is required, proceed as follows:

1. Open the gear cover hood by undoing the safety screw with the supplied special key
2. Undo the stud screw (1) in the setting nut (2)
3. The setting nut (2) is located at the rear end of the main spindle
4. Rotate the setting nut (2) clockwise until the bearings run free again (it must be possible to rotate the main spindle by hand easily)
5. Tighten the stud screw (1) back up again
6. **If the tapered roller bearings are set too tightly they will quickly become unusable**
7. Close the gear cover hood by tightening the safety screw with the supplied special key

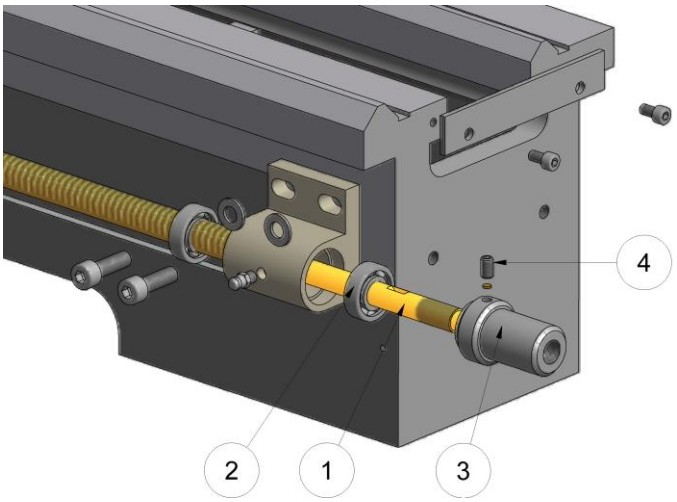


10. Readjustment of the bearing clearance of the lead screw

On the right side, the lead screw is axial mounted. This mount enables the lead screw (1) to be set without play.

If adjustment to the mount is required, please proceed as follows

1. Undo the threaded pin (4)
2. Turn the setting nut (3) clockwise against the ball bearing (2) until the lead screw (1) has no more axial play
3. Then tighten the threaded pin (4) securely



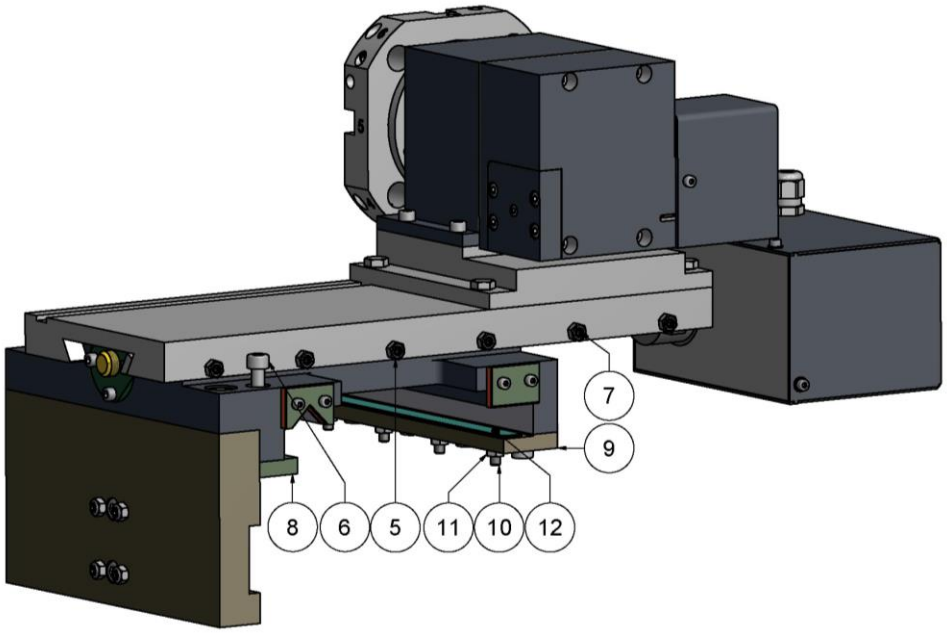
11. Tool skid

The tool skid is positioned, at the front, on a prismatic guide and, at the rear, on a flat guide. The skid is held onto the bed from below with the guide bar (9) and can be set to without play using the setting bar (12).

If adjustment to the setting bar (12) is required, please proceed as follows:

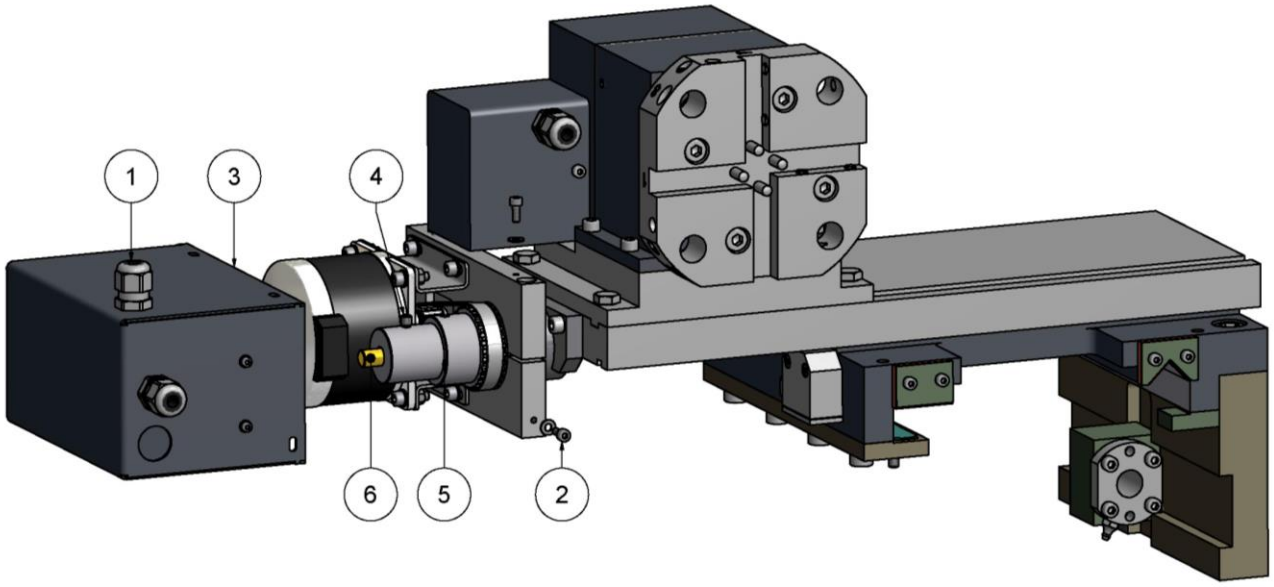
1. Undo the hexagonal nuts (11)
2. Using an Allen key, tighten the threaded pins (10) in such a way that the skid is still able to move easily.
3. After setting, tighten the hexagonal nuts (11) back up again

11. Tool slide



The possibly occurring axial clearance of spindle (6) can be adjusted in spindle bearings.
If adjustment is required, please proceed as follows:

1. Open cable conduit (1) far enough for the cable to pulled through easily.
2. Loosen the four screws (2)
3. Pull off hood (3) from motor support plate by simultaneous release of motor cable.
4. Release set screw (4)
5. Turn belt wheel (5) clockwise until there is no more axial clearance
6. Refasten set screw (4)
7. The spindle (6) has to turn easily after subsequent adjustment
8. Reassemble parts in reverse sequence after adjustment



12. Tailstock

- The tailstock can be moved on the lathe bed.
- By moving the clamping lever (3), the tailstock can easily be secured in any position.
- The tailstock is made up of an upper and lower section.
- The upper section can be moved by a maximum of ±10 mm in order to turn long, slim tapers.

To do this, proceed as follows:

1. Undo the hexagonal nut (6)
2. With the help of both threaded pins (8), slide the upper section into the required direction

- The central position of the tailstock is shown by the scale mark (7)
- Turn a sample to see whether the work piece is cylindrical, correct the tailstock setting if necessary

Tailstock sleeve

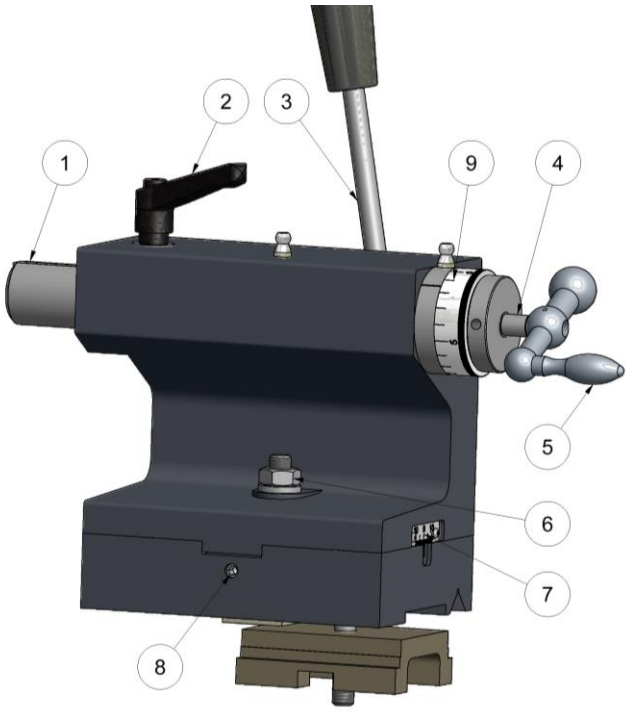
- The solid tailstock sleeve has a millimetre scale.

To read off the distance of travel of the tailstock sleeve, there is a scale ring (9)

- One mark on the scale corresponds to an adjustment of 0.1 mm.
- One turn of the ball crank (5) corresponds to a distance of 2 mm.
- Centre point, drill or drill chucks are **automatically ejected** when turning back.

Tool holder

- There is an **inside cone MK 2** which is designed to hold tools and is incorporated in the sleeve (1).
- Tightening the clamping lever (2) ensures that the sleeve may be easily clamped in any position.
- The sleeve is moved axially by the hand crank (5) by way of the threaded spindle (4).



13. 3 and 4 jaw lathe chuck

The 3-jaw lathe chuck

Is used to tension circular, three and six edged work piece centrally to the spindle axis.

The 4-jaw lathe chuck

Is used to tension square work pieces centrally to the spindle axis.

Risk of accidents

- **Do not attempt to clamp work pieces that are over the permitted clamping range. The clamping force is thus too low and the jaws may come undone**
- **The maximum revolution range specified on the lathe chuck may not be exceeded**

Mounting the jaws:

1. The jaws and guides are numbered from 1 - 3 or 1 – 4.
2. Open the lathe chuck with the key in such a way that the drilling jaws are released (sequence: 3, 2, 1 or 4, 3, 2, 1)
3. Insert turning jaw 1 into guide 1
4. Push turning jaw 1 in the direction of the chuck centre point and, at the same time, turn the chuck key clockwise
5. When the coil has caught turning jaw 1, insert turning jaw 2 into guide 2
6. Repeat the procedure with jaws 2, 3 and 4 (for a four jaw lathe chuck)
7. Then visually check the positions of the jaws. These must meet centrally

Mounting the drilling jaws:

1. If you wish to use the drilling jaws again, the process is the repeated in the same order.
2. Three jaw lathe chuck: First jaw 1, then 2, then 3
3. Four jaw lathe chuck: First jaw 1, then 2, then 3, then 4

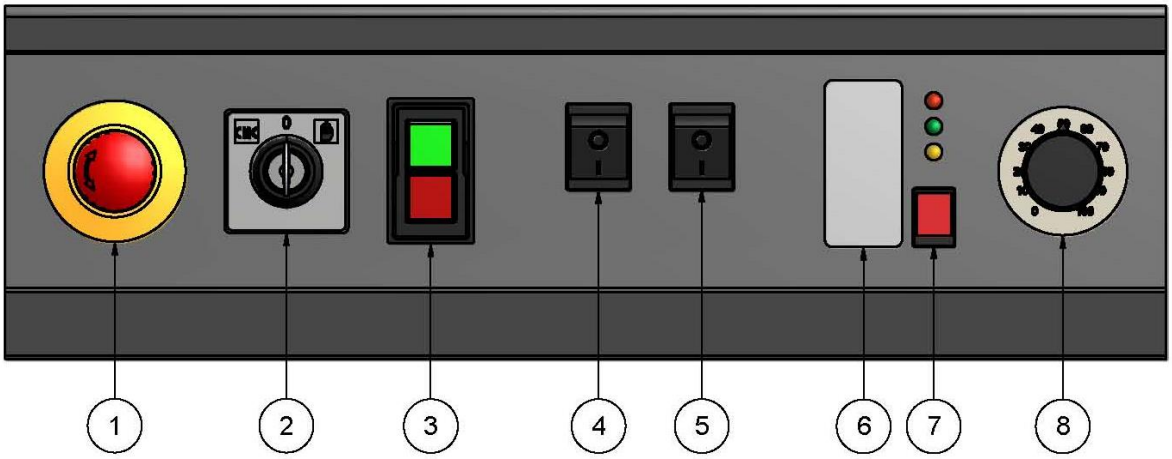
14. Operational faults and the elimination of such

Operational faults	Possible cause	Remedy
Machine cannot be switched on	230V voltage is not present	Plug is not fitted correctly
		Check the fuse for the socket
	Emergency off switch not unlocked	Unlock the emergency off switch
Main spindle motor no longer starts after the unlocking of the emergency off switch	Motor controller must be unlocked	Wait approx. 5 seconds after unlocking the emergency ON/OFF switch before reactivating machine with ON/OFF switch. Also the manual operating field of the software has to be closed and the machine must be reloaded.
Tool skid cannot be moved or can only be moved with considerable force	Clamping of the tool skid is on	Open the clamping
	Guide play is set too narrowly	Adapt the guide play
Transverse cannot be moved or can only be moved with considerable force	Guide play is set too narrowly	Adapt the guide play
Rust on work pieces of machine parts when using coolant lubrication	Wrong coolant set	Check the mixing ratio of the coolant and correct if required (never cool with water alone!)
Tool holder cannot be inserted into the main spindle (reducing sleeve of the main spindle)	An incorrect tool taper of the tool holder has been used in combination with the reducing sleeve	Only use the appropriate tool holders for the machine
	Inner cone of the reducing sleeve or outer cone of the tool holder is contaminated	Clean the relevant cone
Doors of the safety cabin cannot be opened	Machine is not switched off and/or switch for operating modes in zero position	Machine switched of, switch for operating modes on CNC operation of set-up mode
	Main spindle is running	Main spindles stops

14. Operational faults and the elimination of such

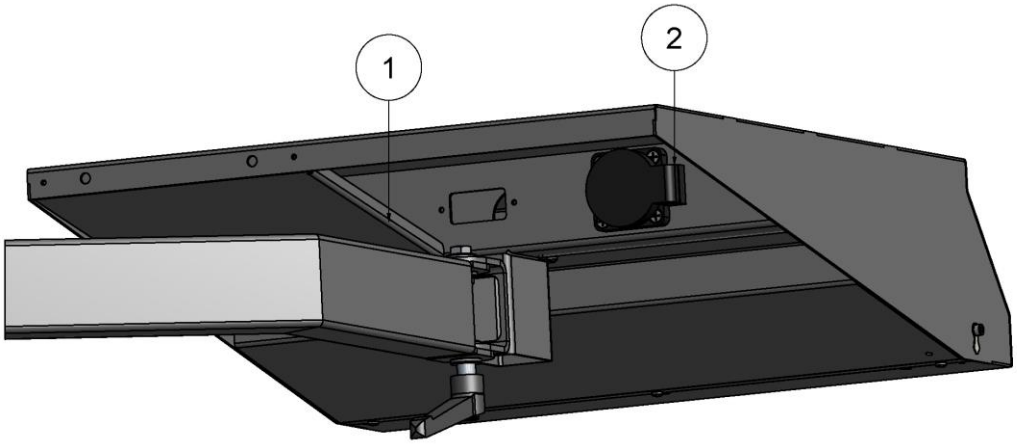
Operational faults	Mögliche Ursache	Abhilfemaßnahme
Tool overheated	Revolutions too high	Reduce the revolutions
	Feed too high	Reduce the feed
	Working without coolant	Use coolant
	Insufficient coolant feed at the cutting edge	Align the coolant hose correctly
	Tool blunt	Sharpen tool or use a new tool
	Increased friction caused by shaving build up in the tensioning groove of the tool (drilling work)	Remove the shavings from the hole more frequently (withdraw)
		Use a coated tool
		Wash the processing area with coolant
	Unsuitable tool chosen for the material to be processed	Only use the suitable tool for the relevant material
Tool cannot be removed from the tailstock sleeve	Tailstock sleeve is not fully cranked back	Fully crank back the tailstock sleeve to automatically eject tools with ejector lugs
	Use tool without ejector lugs	Place a soft and sufficient wide inlay between the tool and tailstock front. Now crank the tailstock sleeve back to push the tool out. (Use of tools without ejector lugs is possible by screwing a suitable threaded pin into place which extends the length of the tool backwards)

15. Operating elements



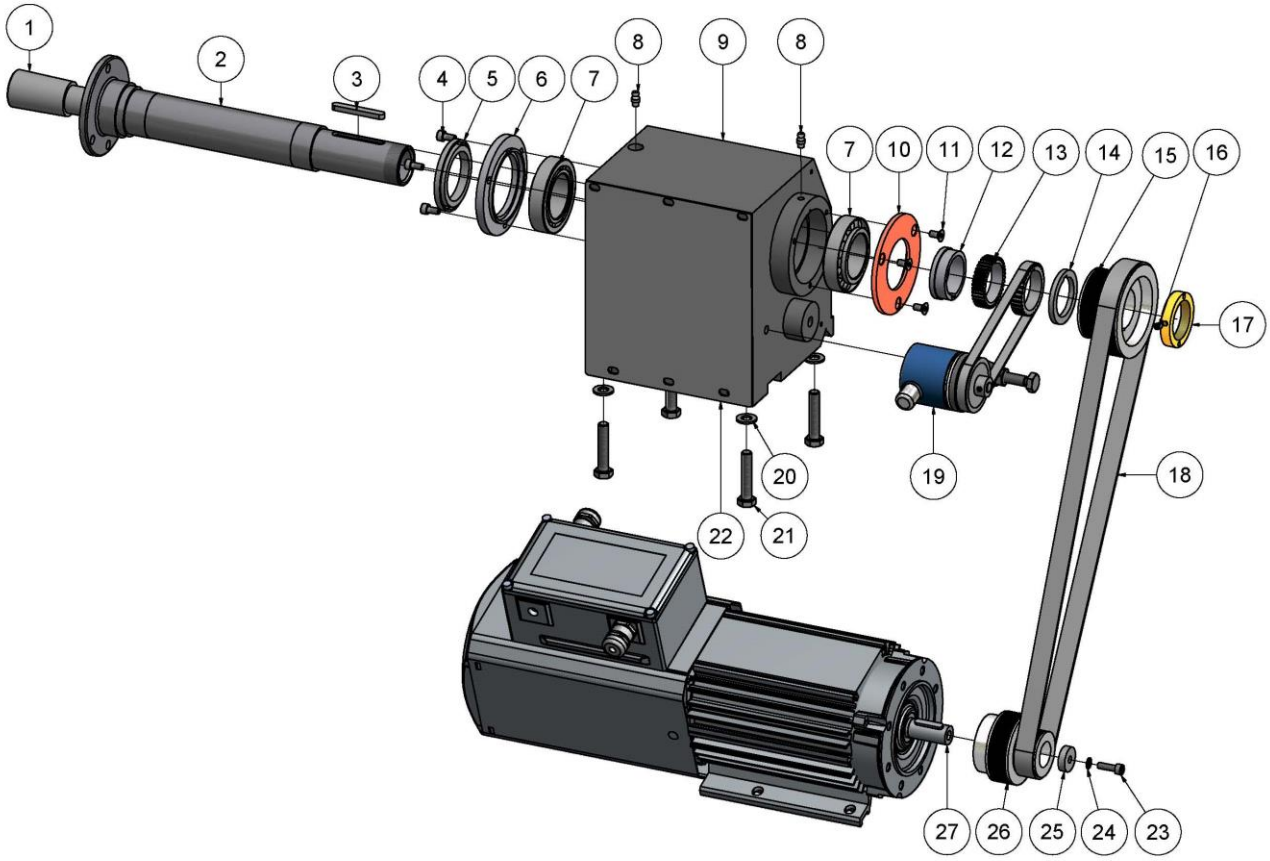
1. Emergency off switch
2. Mode selection switch (CNC operation) (Idle position) (Set-up mode)
3. ON/OFF switch with low voltage trigger
4. Coolant ON/OFF
5. Switch not occupied (available for further functions)
6. Legend to diodes and reset switch
7. Diodes to display the status of the controller
8. Potentiometer rotating knob for speed selection of the electrical drive motor

A plug (2) is located at the rear of the control panel which can be used to power a notebook or computer screen. The control panel contains a storage compartment (1) which can hold the notebook power pack and/or spare cables. If the machine alone is connected to a 16A secured socket, a user with a performance of max. 700W can be connected to the power plug (2) of the control panel.



16. Drawings and legends

16.1 Headstock with Motor



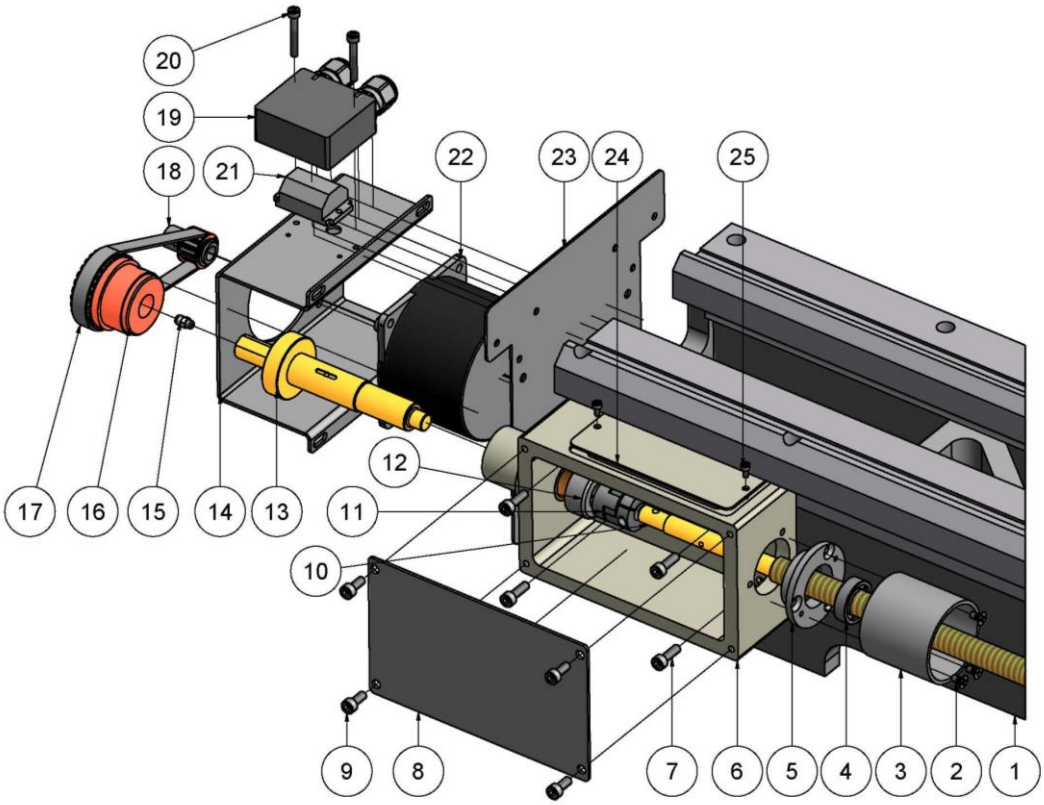
16. Drawings and legends

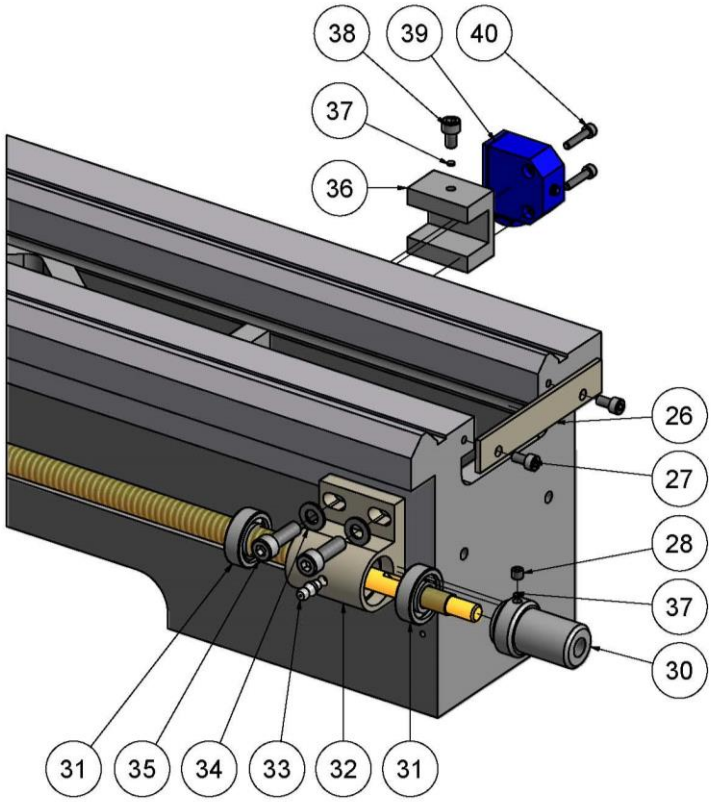
16.1 Headstock with motor

Part No.	Items	Order No.	Description
1	1	10600154	Spindle input
2	1	10600106	Main spindle
3	1	10600171	Parallel key
4	3	16191200006012	Screw
5	1	10600105	Oil scraper ring
6	1	10600104	Flange
7	2	51502109	Tapered roller bearing
8	2	51502517	Lubrication nipple
9	1	10600101	Headstock
10	1	10600104	Flange
11	3	16196500006012	Screw
12	1	51004055-0003	Bush with collar
13	1	10600137	Toothed wheel
14	1	51004055-0004	Sleeve
15	1	51006600-0001	Gear wheel
16	1	16091300006008	Threaded pin
17	1	10600140	Nut
18	1	51502300	Belt
19	1	1062800	Rotary encoder complete
20	4	16112500010000	Washer
21	4	16193300010050	Screw
22	1		Headstock cover *(contained in cabin)*
23	1	16191200006020	Screw
24	1	16167980006000	Fanned washer
25	1	51004025-0024	Pressure washer
26	1	51006675-0001	Gear wheel motor
27	1	51500128-00041	Motor with pulley

16. Drawings and legends

16.2 Bed with lead screw





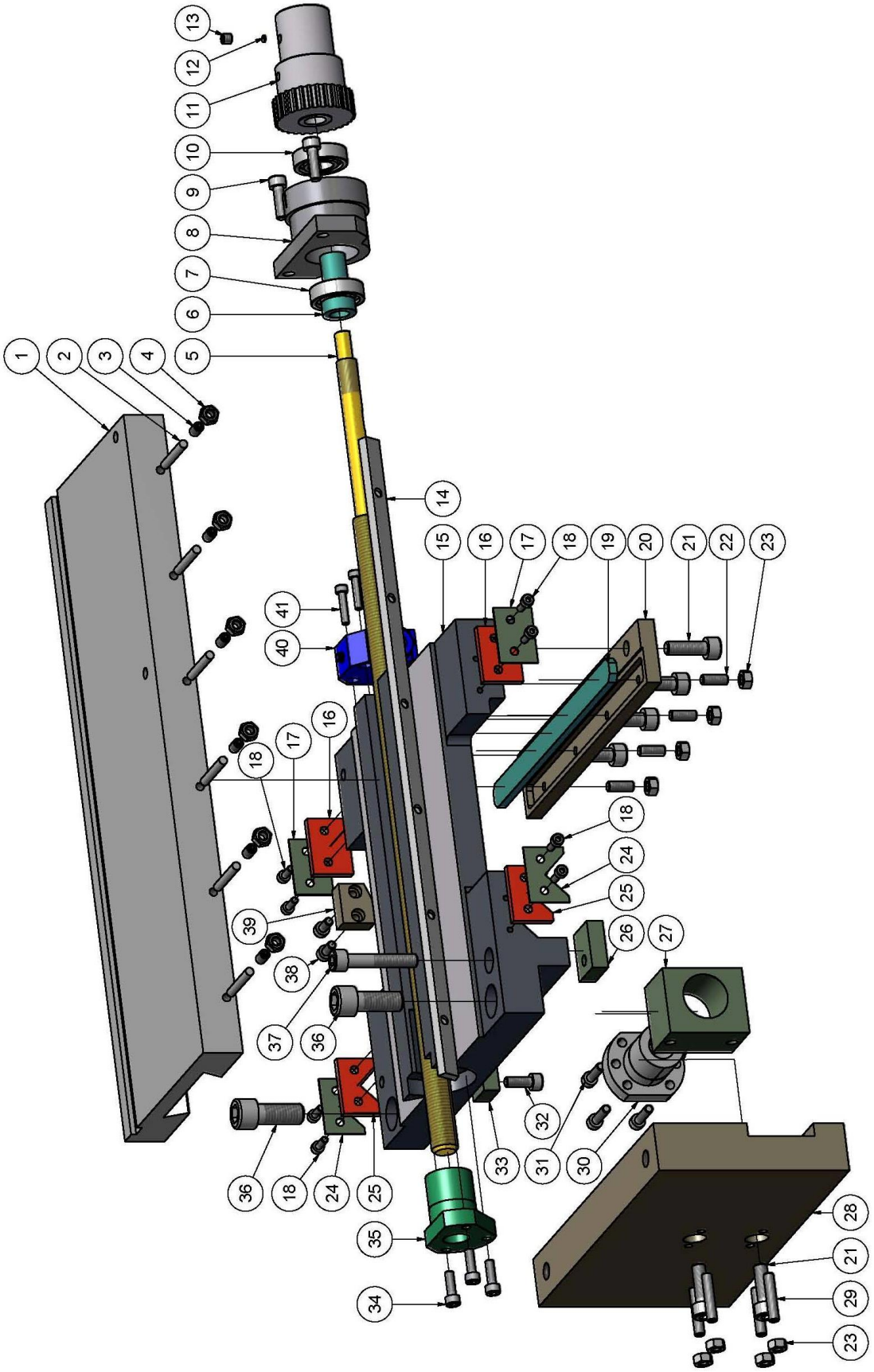
16. Drawings and legends

16.2 Bed with lead screw

Part No.	Items	Order No.	Description
1	1	10600601	Bed
2	3	16196500004008	Countersunk screw
3	1	51006555-0020	Sleeve
4	1	51502112	Ball bearing
5	1	51006555-0007	Bearing flange
6	1	10600602	Support bearings, front
7	4	16191200005016	Screw
8	1	51402152-0001	Cover lead spindle bearing
9	4	16191200005012	Screw
10	1	51505226	Ball screw with ball nut
11	1	51502656	Coupling
12	1	161705A0018000	Adjusting ring
13	1	51004040-0011	Feed shaft
14	1	51402150-0001	Motor bracket Z-axis
15	1	51502518	Lubrication nipple M5
16	1	51004050-0013	Toothed belt pulley
17	1	51502320	Gear belt
18	1	51004020-00022	Toothed belt pulley Z12
19	1	51402115-0001	Terminal box
20	2	16191200004030	Screw
21	1	51500706	Terminal clamp
22	1	51500122	Multiphase motor
23	1		Cover guide head stock (contained in cabin)
24	1	10600616	Bearing cover
25	2	16191200003006	Screw
26	1	51002020-0004	Tailstock stopper
27	2	16191200005012	Screw
28	1	16091300006006	Threaded pin
29	1	51007250-0001	Push piece
30	1	51004035-0007	Setting nut
31	2	51502112	Ball bearing
32	1	10600615	Support bearing, rear
33	1	51502517	Lubrication nipple
34	2	16112500008001	Washer
35	2	16191200008025	Screw
36	1	51006940-0001	Support for CNC limit switch
37	1	51007250-0001	Push piece
38	1	16191200006010	Screw
39	1	51500633-0002	End switch
40	2	16191200004020	Screw

16. Drawings and legends

16.3 Cross slide with saddle apron



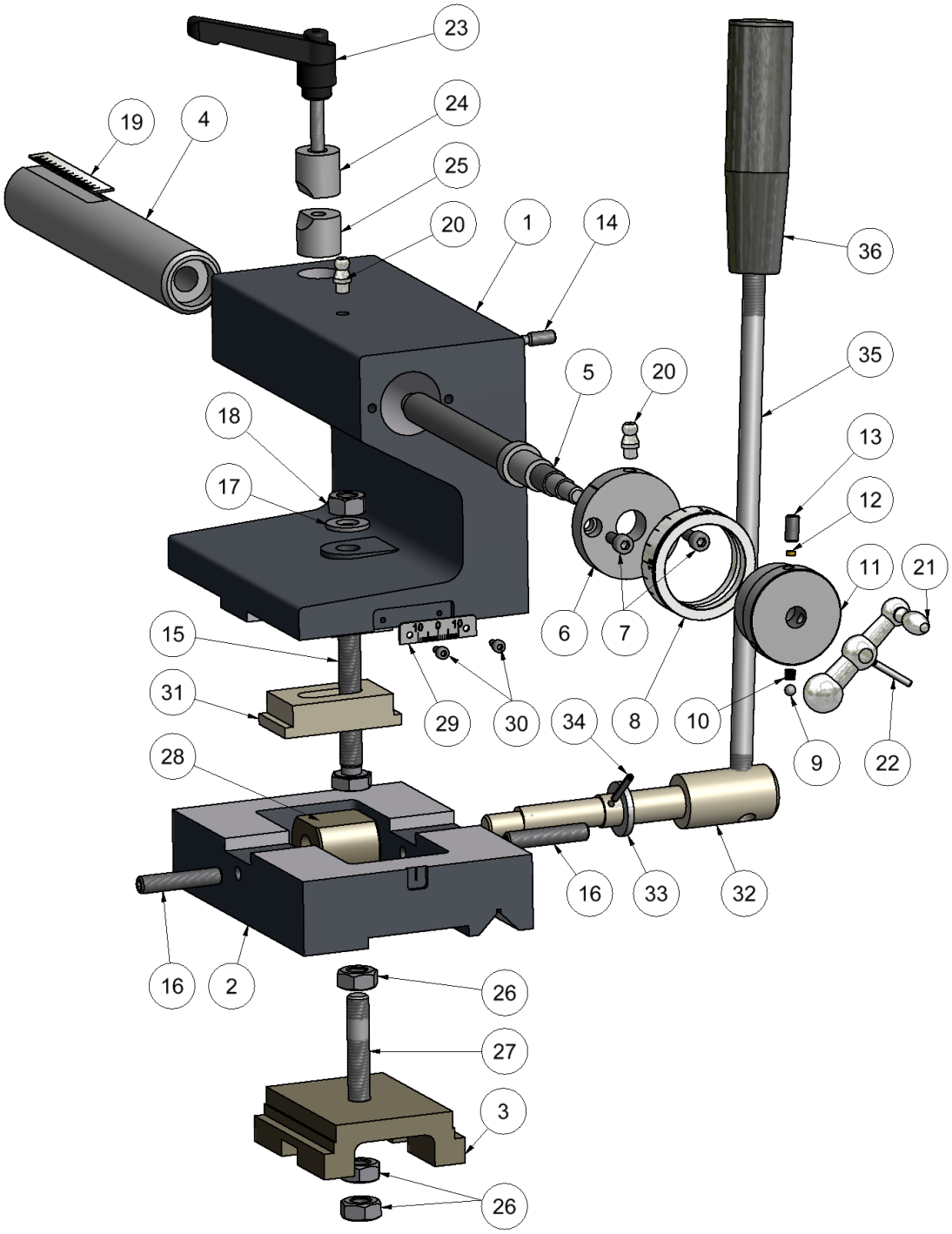
16. Drawings and legends

16.3 Cross slide with saddle apron

Part No.	Items	Order No.	Description
1	1	51007176-0001	Transverse skid, upper section
2	6	16063250005040	Cylinder pin
3	6	16091300006010	Threaded pin
4	6	16193400006000	Nut
5	1	51505210-0005	Ball screw spindle with ball screw nut
6	1	51004020-0014	Reducing bush
7	1	51502113	Ball bearing
8	1	106000316	Spindle bearing, transverse skid
9	2	16191200006020	Screw
10	1	51502113	Ball bearing
11	1	51004050-0001	Toothed belt wheel Z30
12	1	51007250-0001	Push piece
13	1	16091300006006	Threaded pin
14	1	51001017-0003	Adjustment bar
15	1	10600701	Transverse skid, lower section
16	2	10600390	Felt
17	2	10600388	Felt clamp
18	8	16191200004010	Screw
19	1	10600391	Setting bar
20	1	10600328	Guide bead
21	4	16193300008025	Screw
22	4	16091300006012	Threaded pin
23	8	16193400006000	Nut
24	2	10600383	Felt clamp
25	2	10600382	Felt
26	1	10600376	Guide bar
27	1	10600719	Ball-nut bracket
28	1	10600714	Lock plate
29	4	16091300006025	Threaded pin
30	1	51505226	Ball nut with ball spindle
31	4	16191200005020	Screw
32	1	16191200006012	Screw
33	1	106003417	Guide
34	3	16191200005016	Screw
35	1	51505210-0005	Ball nut with ball spindle
36	2	16191212012035	Screw
37	1	16191200008045	Screw
38	6	16191200005012	Screw
39	1	51006425-0001	Limit stop switch
40	1	51500633-0001	End switch
41	2	16191200004020	Screw

16. Drawings and legends

16.4 Tailstock



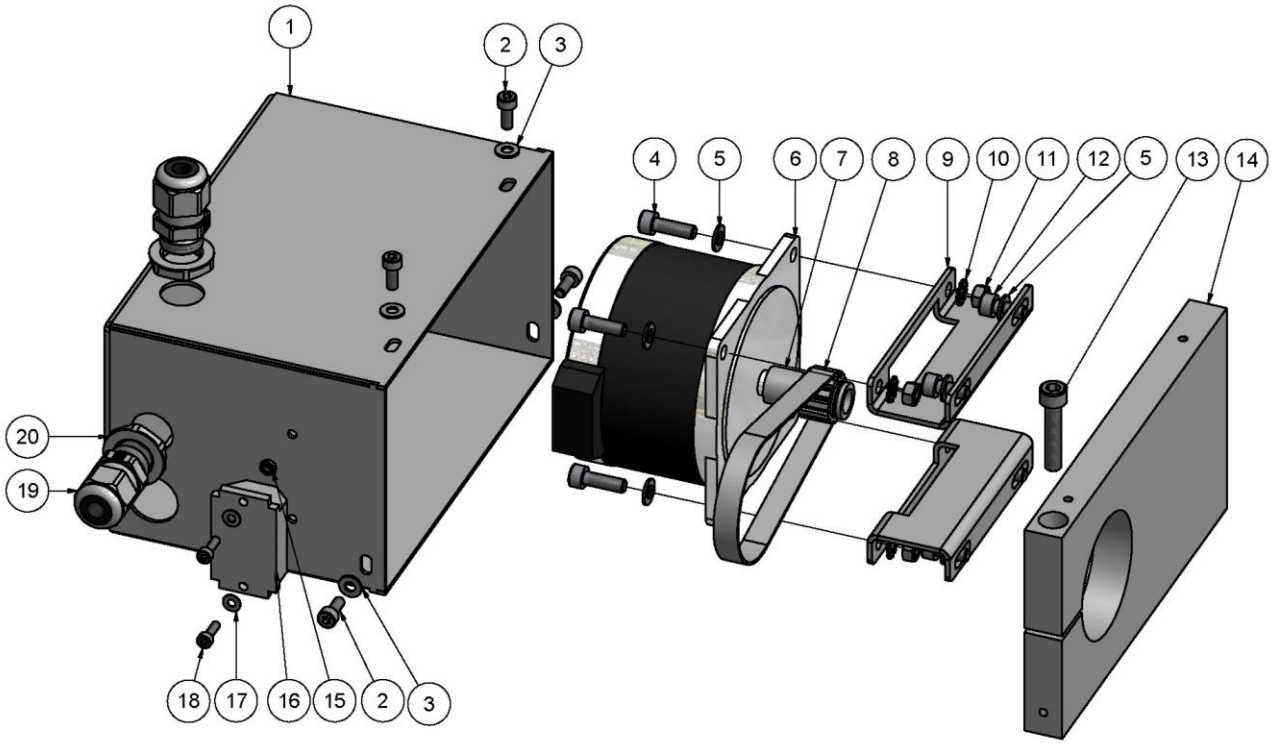
16. Drawings and legends

16.4 Tailstock

Part No.	Items	Order No.	Description
1	1	10600401	Tailstock upper section
2	1	10600402	Tailstock lower section
3	1	10600403	Clamping piece
4	1	10600404	Sleeve
5	1	51004020-0019	Spindle
6	1	51006550-0001	Flange
7	2	16191200005012	Screw
8	1	10600408	Scale ring
9	1	51502131	Steel ball
10	1	51502009	Pressure spring
11	1	51004045-0011	Dial
12	3	51007250-0001	Push piece
13	3	16091300006010	Threaded pin
14	1	16091500006016	Threaded pin
15	1	16193300010070	Screw
16	2	16191300008040	Threaded pin
17	1	16112500010000	Washer
18	1	16193400010000	Nut
19	1	10600419	Scale tape
20	2	51502517	Lubrication nipple
21	1	51507022-0001	Ball crank
22	1	16073430003018	Spiral tensioning pin
23	1	51507033	Tensioning lever
24	1	10600424	Sleeve clamping element, top
25	1	10600425	Sleeve clamping element, bottom
26	3	16193400010000	Nut
27	1	16091300010050	Stud bolt
28	1	10600428	Clamping bush
29	1	10600429	Scale
30	2	16191200003006	Screw
31	1	10600431	Clamping strap
32	1	10600432	Eccentric shaft
33	1	10600433	Washer
34	1	16073430003024	Spiral tensioning pin
35	1	10600435	Lever
36	1	10600436	Handle

16. Drawings and legends

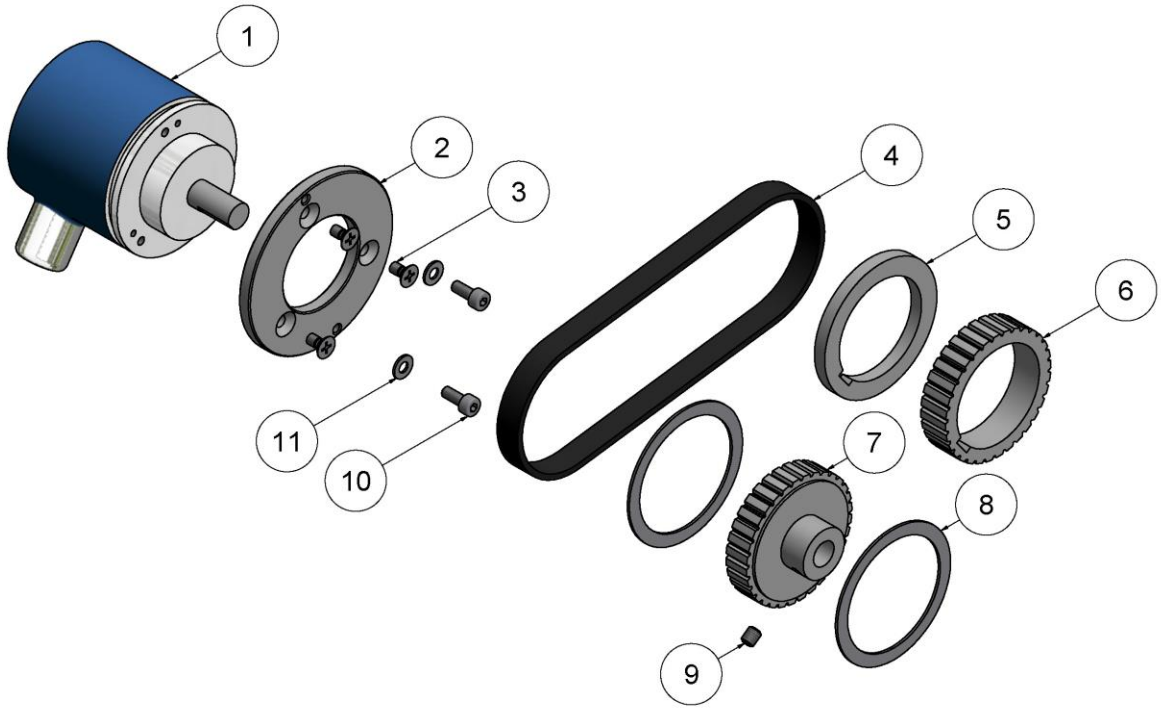
16.5 CNC drive X-axis



Part No.	Items	Order No.	Description
1	1	51402151-0001	Motor cover
2	4	16191200004010	Screw
3	4	16112500004000	Washer
4	4	16191200005016	Screw
5	8	16112500005000	Washer
6	1	51500122	Motor
7	1	51004020-00022	CNC drive X-axis
8	1	51502321	Gear belt
9	2	51402153-0001	Bracket
10	4	16167980005000	Fanned washer
11	4	16193400005000	Nut
12	4	16191200005012	Screw
13	1	16191200006030	Screw
14	14	51006491-0001	Motor bracket

16. Drawings and legends

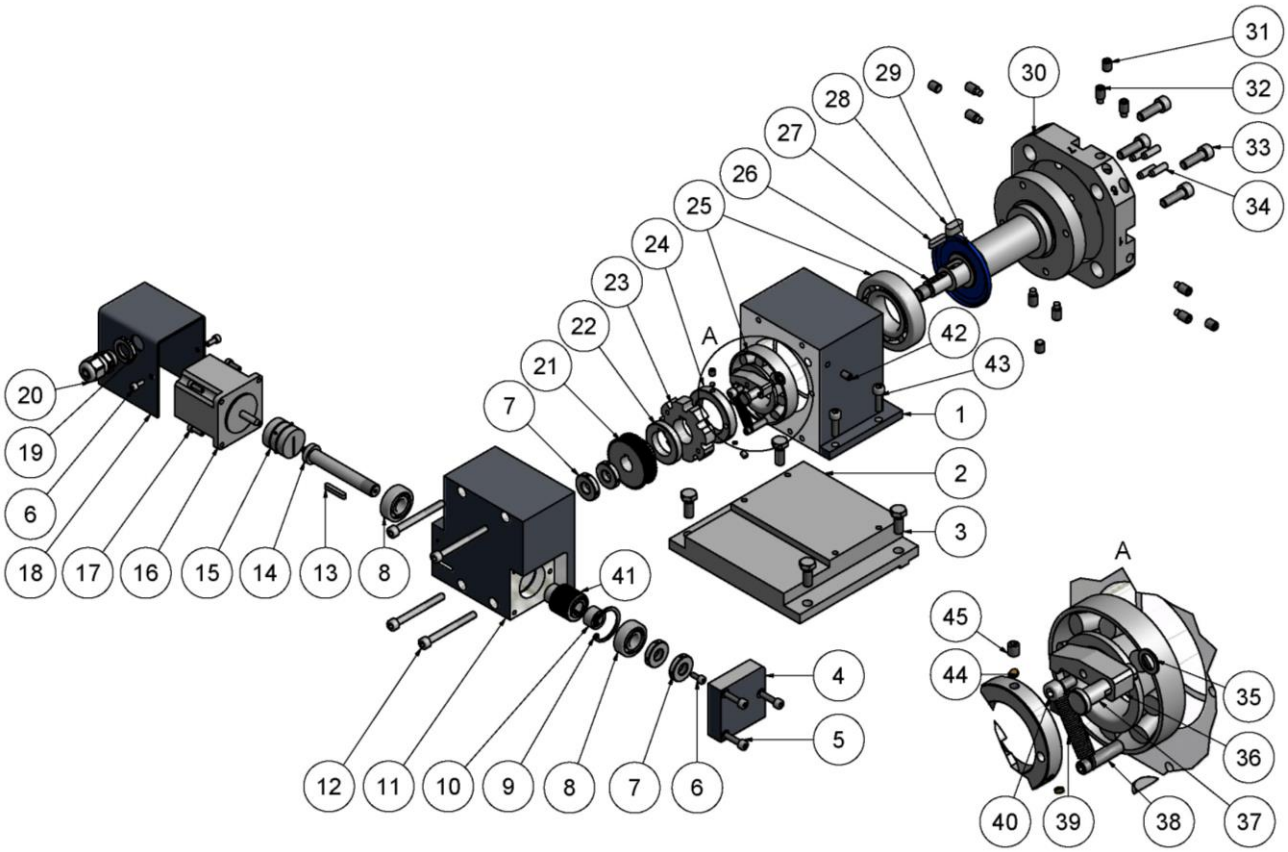
16.6 Speed sensor



Part No.	Items	Order No.	Description
1	1	51500101-0001	Speed sensor
2	1	51006575-0003	Holding flange
3	3	16196500004008	Screw
4	1	51502323	Gear belt
5	1	51004055-0004	Sleeve
6	1	51006555-0002	Toothed belt wheel Z32
7	1	51006555-0001	Toothed belt wheel Z32
8	2	16000002214020	Adjusting washer
9	1	16191300005006	Threaded pin
10	2	16191200004010	Screw
11	2	16112500004000	Washer

16. Drawings and legends

16.7 CNC 8-fold tool changer



Part No.	Items	Order No.	Description
1	1	51508480-00011	Basic body
2	1		Base plate (contained in tool changer)
3	4	16193300008020	Screw
4	1	51508480-00031	Bearing cover
5	3	16191200005020	Screw
6	3	16191200004010	Screw
7	4	51004025-0021	Capstan nut
8	2	51502118	Ball bearing
9	1	16047200032000	Securing ring
10	1	51004018-0003	Spacer ring
11	1	51508480-00021	Cover
12	4	16191200006060	Screw
13	1	1606885A040425	Parallel key
14	1		Worm gear (contained in tool changer)
15	1	51502600-0001	Coupling
16	1	51500113	Motor
17	4	16191200004012	Screw

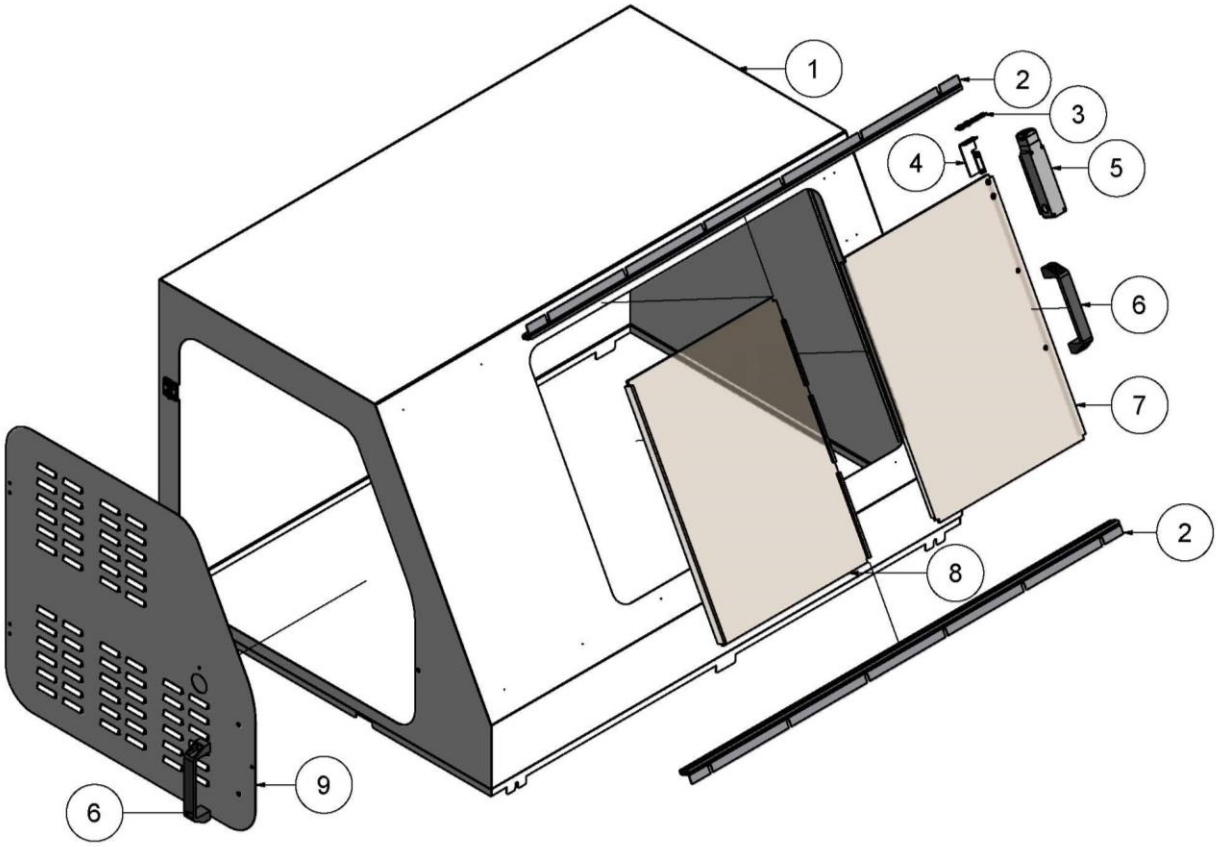
16. Drawings and legends

16.7 CNC 8-fold tool changer

Part No.	Items	Order No.	Description
18	1	51401812-0001	Cover hood
19	1	51501505	Counter nut
20	1	51501533	Cable screw
21	1	51502601	Worm gear
22	1	51508480-00051	Spacer
23	1	51508480-00041	Ratchet wheel
24	1	51004055-0001	Capstan nut
25	2	51502108	Tapered roller bearing
26	1		Main spindle (contained in tool changer)
27	1	1606885A005020	Parallel key
28	1	6885A080818-01	Parallel key
29	1	51502199	Nilos ring
30	1	51508481	Tool carrier disc
31	4	16091300008010	Threaded pin
32	8	16091500008016	Threaded pin
33	4	16191200008025	Screw
34	4	160635250006020	Cylinder pin
35	1		Spacer disc (contained in tool changer)
36	1		Ratchet (contained in tool changer)
37	1		Bolt (contained in tool changer)
38	1		Bolt (contained in tool changer)
39	1	51502036	Tension spring
40	1	16191200005010	Screw
41	1	51502602	Worm gear
42	1	16091300006010	Threaded pin
43	4	16191200006020	Screw
44	3	51007250-0001	Push piece
45	3	16091300005006	Threaded pin

16. Drawings and legends

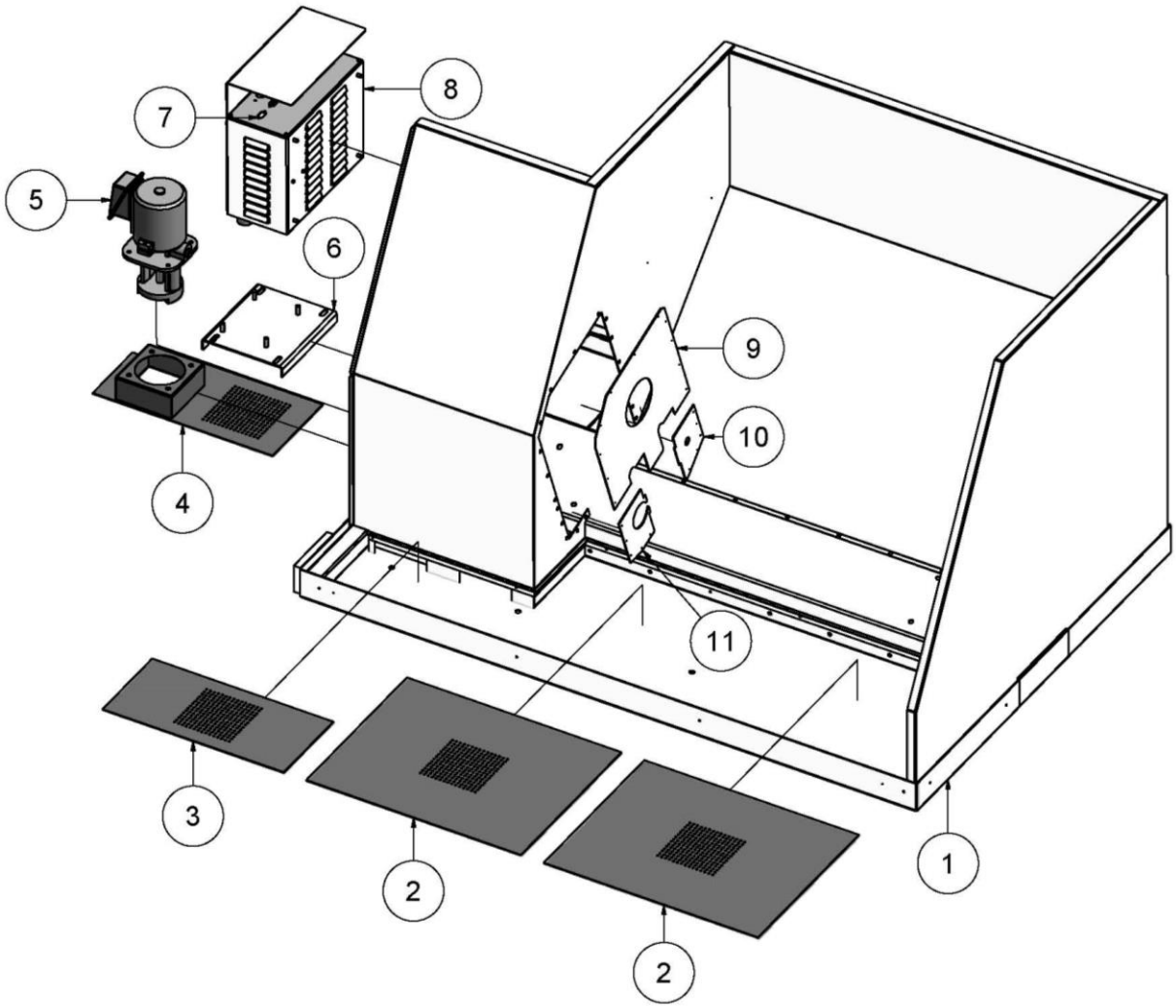
16.8 Safety cabin hood



Part No.	Items	Order No.	Description
1	1	51402020-0001	Cabin hood
2	2		Sliding door guide (included in cabin 51402020-0001)
3	1	51500642	Activator for safety switch
4	1		Bracket activator (contained in cabin 51402020-0001)
5	1	51500638	Safety switch
6	2	51507006	Ball handle
7	1	51402030-0001	Sliding door, front
8	1	51402030-0002	Sliding door, rear
9	1		Drive-protection door (included in cabin 51402020-0001)

16. Drawings and legends

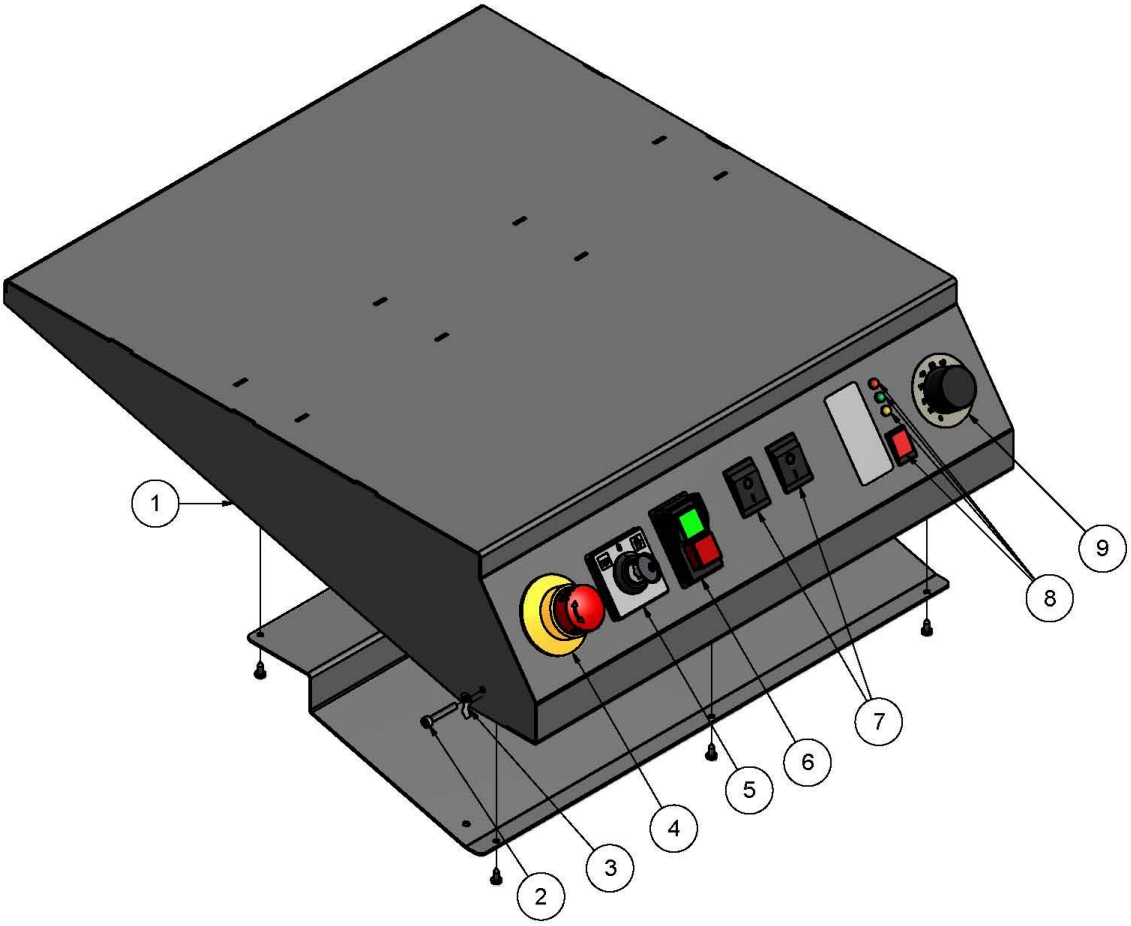
16.9 Safety cabin interior

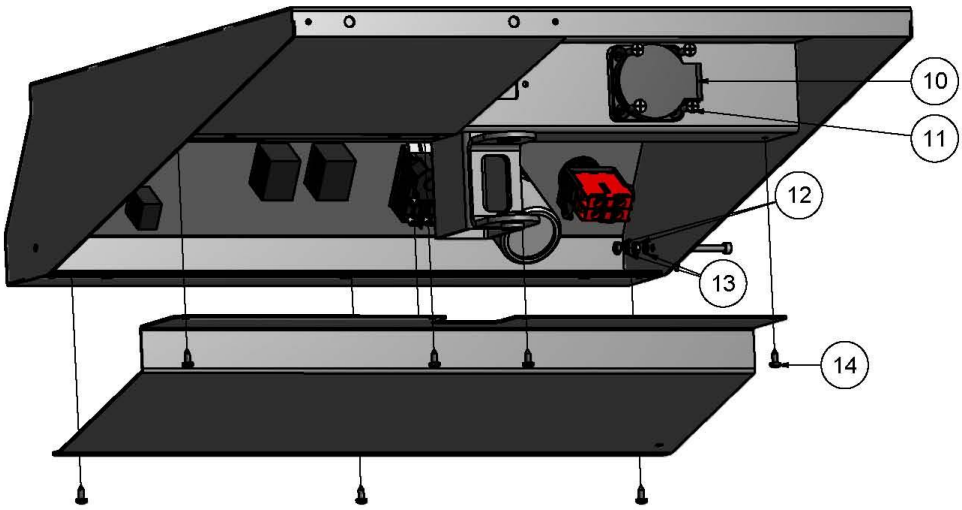


Part no.	Item	Order no.	Description
1	1		Interior cabin (contained in cabin 51402020-0001)
2	2		Coolant tray (contained in cabin 51402020-0001)
3	1		Coolant tray, left (included in cabin 51402020-0001)
4	1		Coolant tray, pump (included in cabin 51402020-0001)
5	1	51000119-0007	Coolant pump
6	1		Clamping slide motor (included in cabin 51402020-0001)
7	1	51401481-0001	Control box
8	1		Control palatine nccad professional
9	1	51400485-0001	Protective plate spindle passage
10	1		Cover plate bed, rear (included in cabin 51402020-0001)
11	1		Cover plate bed, front (included in cabin 51402020-0001)

16. Drawings and legends

16.10 Operating console





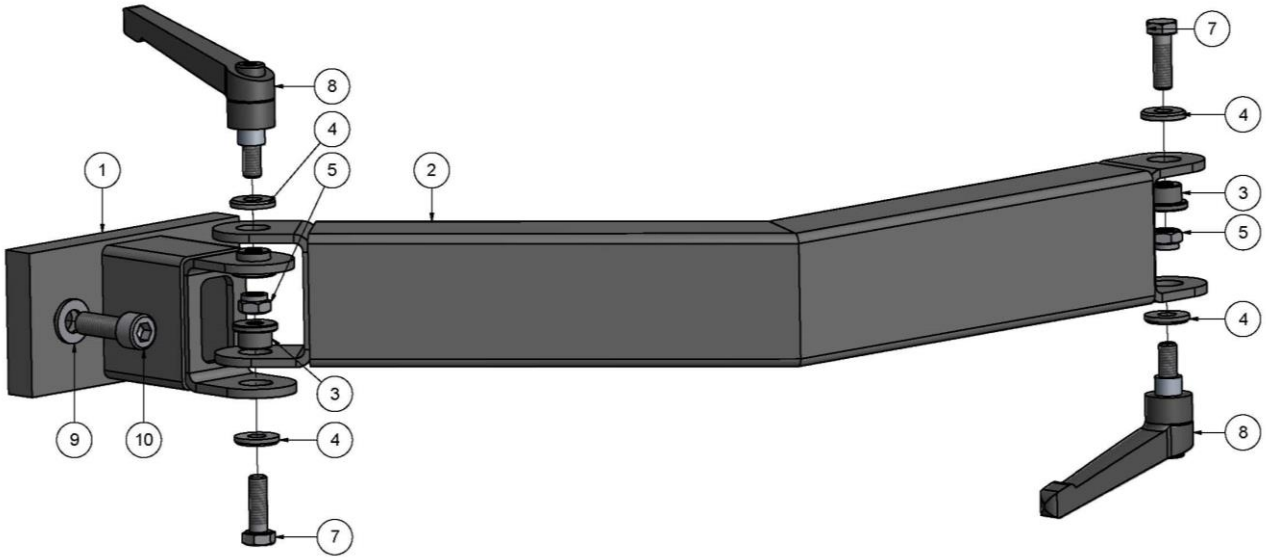
16. Drawings and legends

16.10 Operating console

Part no.	Item	Order no.	Description
1	1	51401485-0001	Operating console
2	1	16191200004025	Screw
3	1	51501304	Symbol for mass connection
4	1	51500624-0001	Emergency Off button complete
5	1	51500600	Turn switch
6	1	51500606	On-Off switch
7	2	51500601	Toggle switch
8	1		LED's with switch (included in control packet)
9	1	51500801-0001	Potentiometer
10	1	51500772	Power socket
11	4	16196500004009	Countersunk screw
12	2	16193400004000	Groove
13	2	16197980004000	Fanned washer
14	7	16179810003095	Screw

16. Drawings and legends

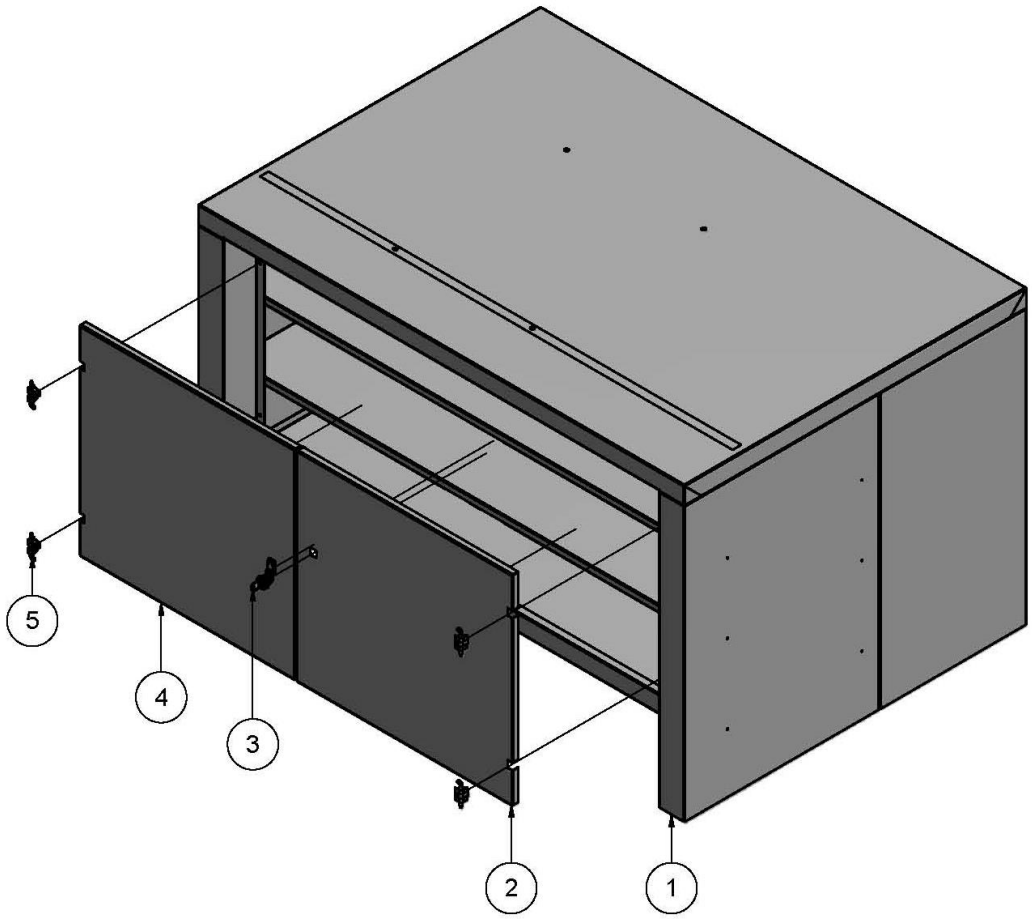
16.11 Support arm for control panel



Part no.	Item	Order no.	Description
1	1	51002130-00041	Base plate with joint to support arm
2	1	51002416-00021	Square pipe with joints
3	2	51004020-0024	Guide bush to support arm
4	4	51004020-0010	Washer Ø20x8,1x3
5	2	16198500008000	Groove
6	2	16091300008030	Threaded pin
7	2	16193300008025	Screw
8	2	51507031	Clamping lever
9	2	16112500010000	Washer
10	2	16191200010030	Screw

16. Drawings and legends

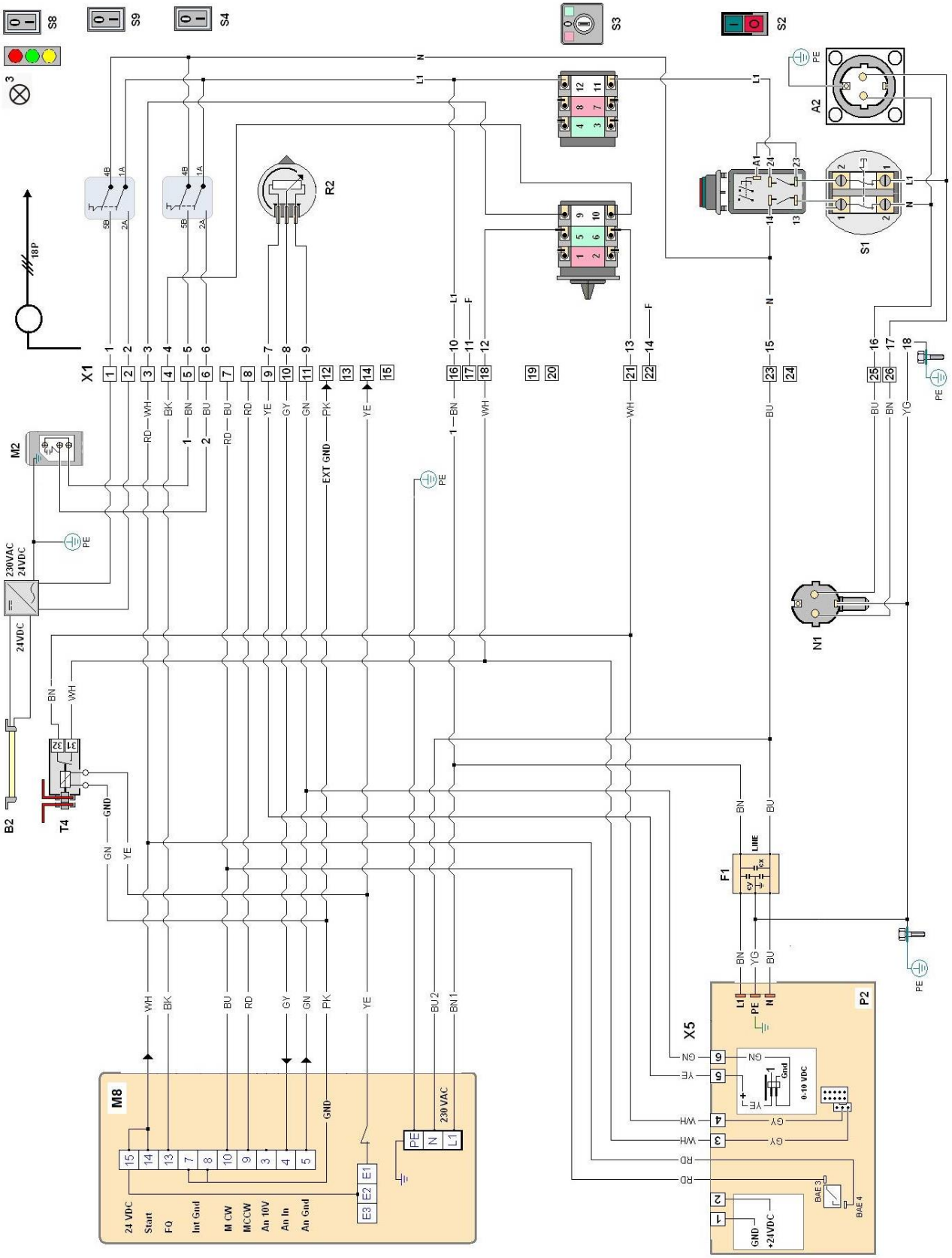
16.12 Base cabinet (optional)



Part no.	Item	Order no.	Description
1	1	1120268	Base cabinet
2	1		Door (contained in Art.-No. 1120268)
3	1		Lock (contained in Art.-No. 1120268)
4	1		Door (contained in Art.-No. 1120268)
5	4		Hinge (contained in Art.-No. 1120268)

17. Circuit diagram

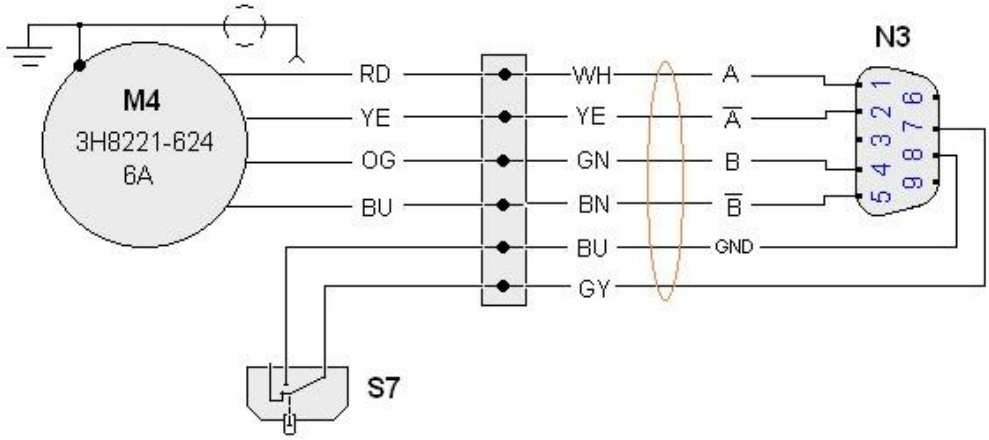
17.1 Overall connection diagram

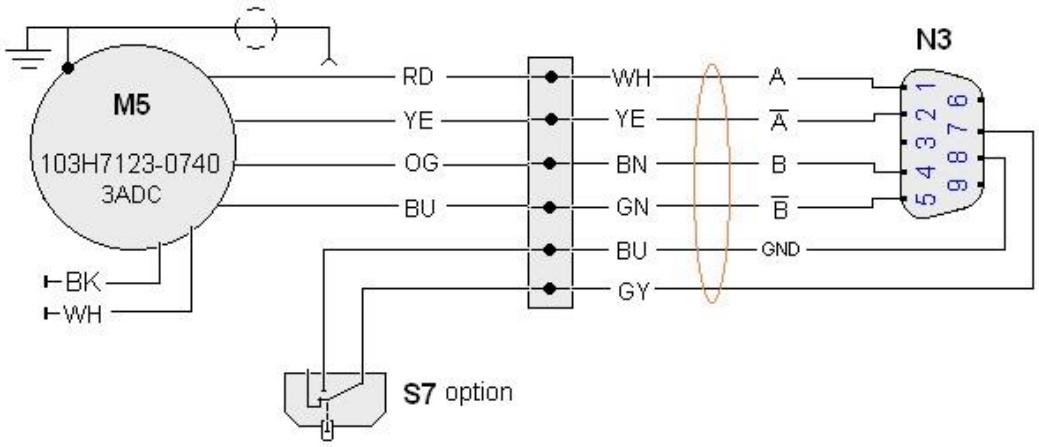


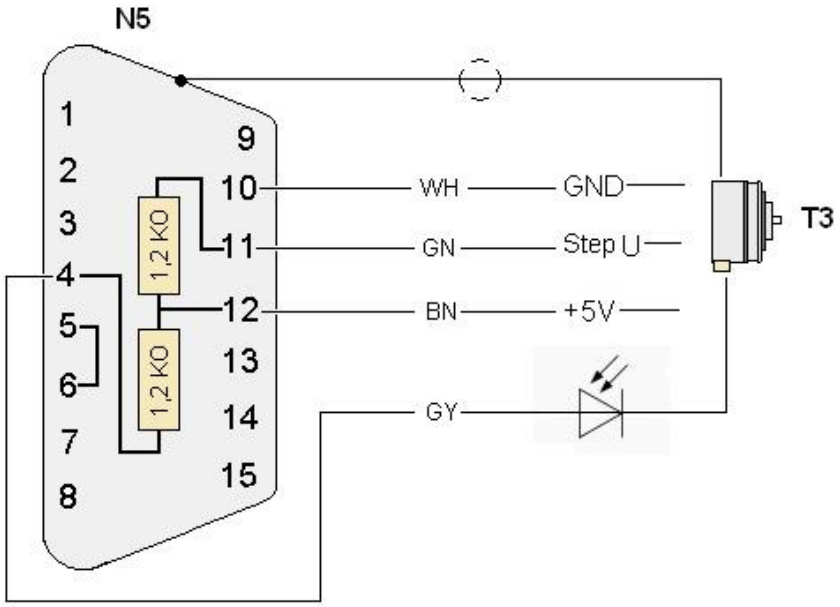
see legend for circuit diagrams 17.3

17. Circuit diagram

17.2 Axis motors and rotary encoders







see legend for circuit diagrams 17.3

17. Curcuit diagram

17.3 Key for circuit diagram

Color-code by IEC 60757

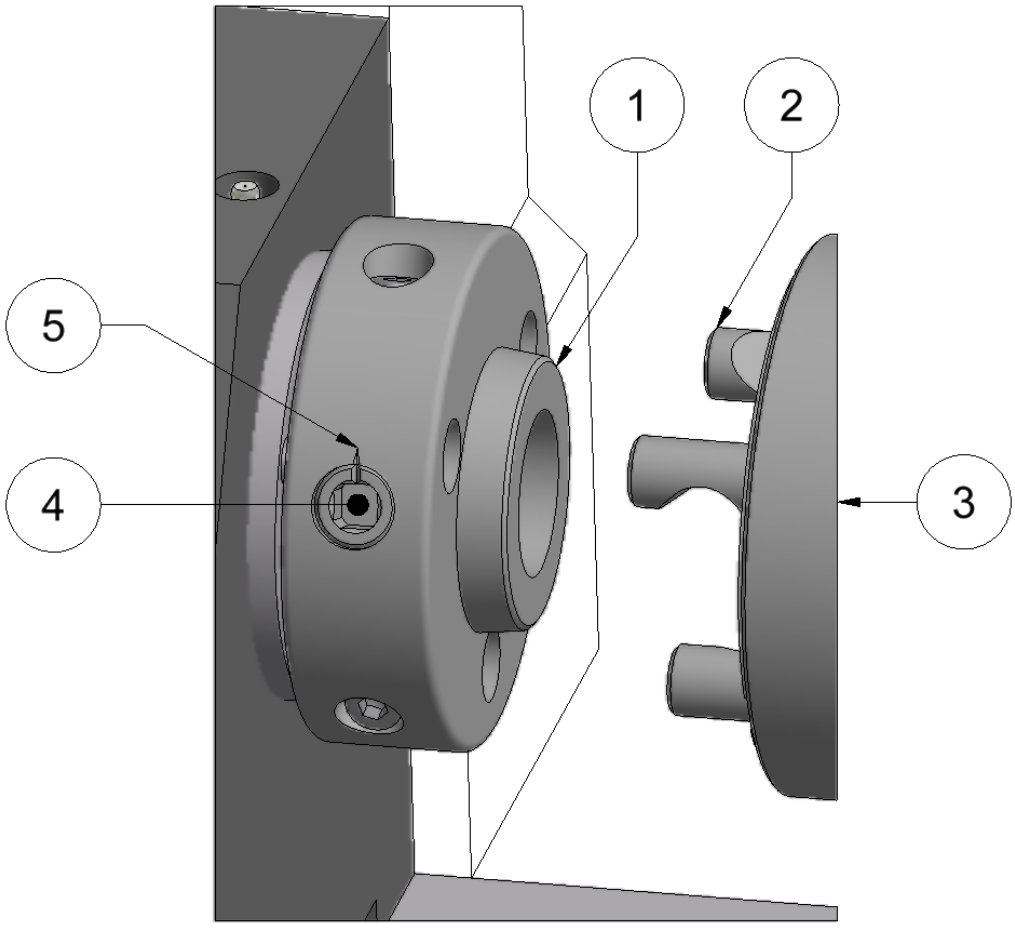
BK	Black	PK	Pink
BN	Brown	RD	Red
BU	Blue	VT	Violet
GN	Green	WH	White
GY	Grey	YE	Yellow
OG	Orange	YG	Yellow/Green

A2	Socket 230VAC
B2	Machine lamp
F1	Noise filter
M2	Coolant pump
M3	Fan for industrial screen
M4	Axis motor 3H8221 - 624/6A, XYZ axis
M5	Axis motor t-axis 103H7123-0740 3 ADC
M8	Main spindle motor 2.0 KW, high-speed
N1	Power plug
N3	9- pin plug
N4	Axle motor terminal block
N5	15-pin, Sub-D plug
P2	CNC control board
PE	Protection against electrical shock
R2	10 kΩ (ohm) potentiometers spindle speed
S1	Emergency switch-off
S2	Main switch with low voltage trigger
S3	Selection switch
S4	Switch coolant
S5	End switch safety cabin
S7	End switch
S8	Main switch with CNC control status display
S9	Switch for machine lamp
T3	Encoder for spindle revolutions
T4	Lock for operator door with query
X1-10	Cabling terminal block

20. Camlock main spindle (optional)

20.1 Undoing a chuck or holding flange from the camlock main spindle lug

- Open the three clamping tappets (4) located around the circumference of the main spindle (1) using an Allen key in size 10 mm (not included in the scope of delivery).
- After opening, the markings of the clamping tappets must, as shown, point to the markings on the main spindle.
- The moving of the camlock bolt (2) and thus the removal of the chuck or holding flange is only possible if both markings point to one another.
- Remove the chuck or the holding flange.



20.2 Blocking a chuck or holding flange on the camlock main spindle lug

- Ensure that the markings on the clamping tappets (4) point to those markings on the main spindle (1).
- Place the chuck or holding flange on the main spindle, in doing so, insert the camlock bolt (2) into the holes drilled in the main spindle.
- Tighten the three clamping tappets (4) located around the circumference of the main spindle (1) using an Allen key in size 10 mm (not included in the scope of delivery), so that the chuck or holding flange pulls towards the main spindle.